



Service Manual

Serial Number Range

GTH-1544 (Perkins Tier 4i)

From GTH1513 B-2

GTH-1544 (Deutz Tier 4i)

From GTH1513 B-1
plus 24273

Part No. 57.4400.9208

Rev C

April 2015

Introduction

Important

Read, understand and obey the safety rules and operating instructions in the *Genie GTH-1544 Operator's Manual* before attempting any maintenance or repair procedure.

This manual provides detailed scheduled maintenance information for the machine owner and user. It also provides troubleshooting fault codes and repair procedures for qualified service professionals.

Basic mechanical, hydraulic and electrical skills are required to perform most procedures. However, several procedures require specialized skills, tools, lifting equipment and a suitable workshop. In these instances, we strongly recommend that maintenance and repair be performed at an authorized dealer service center.

Compliance

Machine Classification

Group B/Type 3 as defined by ISO 16368

Machine Design Life

Unrestricted with proper operation, inspection and scheduled maintenance.

Technical Publications

Genie has endeavored to deliver the highest degree of accuracy possible. However, continuous improvement of our products is a Genie policy. Therefore, product specifications are subject to change without notice.

Readers are encouraged to notify Genie of errors and send in suggestions for improvement. All communications will be carefully considered for future printings of this and all other manuals.

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Revision History

Revision	Date	Section	Procedure / Schematic Page / Description
A	07/2013		Initial Release
B	10/2013	4 - Repair 6 - Schem.	4-30 6-34, 6-36
C	04/2015	6 -Schem.	6-11, 6-18 & 6-26, 6-32
REFERENCE EXAMPLES:			
Kubota Engine_Section 2_Specifications. A-6,B-3,C-7_Section 3_Maintenance Procedure. 3-2, 6-4, 9-1_Section 4_Repair Procedure. Fault Codes_Section 5. 6-35, 6-56, 6-104_Section 6_Schematic Page #.			Electronic Version Click on any procedure or page number highlighted in blue to view the update.

REVISION HISTORY, CONTINUED

Revision	Date	Section	Procedure / Schematic Page / Description
REFERENCE EXAMPLES:			
Kubota Engine_Section 2_Specifications. A-6,B-3,C-7_Section 3_Maintenance Procedure. 3-2, 6-4, 9-1_Section 4_Repair Procedure. Fault Codes_Section 5. 6-35, 6-56, 6-104_Section 6_Schematic Page #.			Electronic Version Click on any procedure or page number highlighted in blue to view the update.

Serial Number legend



MODEL: GTH-1544
 SERIAL NUMBER: GTH-1513 B - xxxxx
 ATTACHMENT:
 MANUFACTURE DATE: 04/05/13
 TOTAL TRUCK WEIGHT (LBS): 33,686 lbs / 15,280 kg
 MAX LIFT CAPACITY (LBS): 15,000 LBS

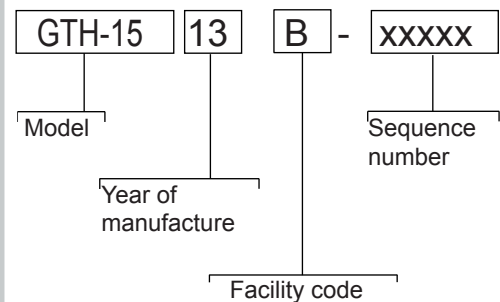
LIFT CAPACITY (LBS)
 AT MAX LIFT HEIGHT: 10,000 LBS

OUTRIGGERS UP: N/A
 OUTRIGGERS DOWN: N/A

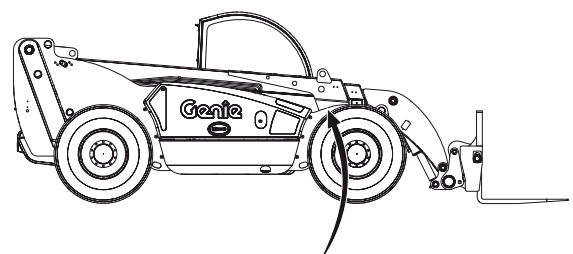
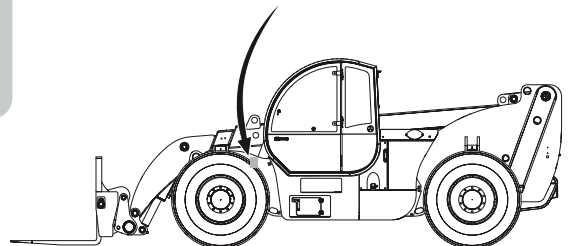
COUNTRY OF MANUFACTURE: Italy

MANUFACTURER:
 Terexlift s.r.l.
 Zona industriale Buzzacchero
 06019 - Umbertide (PG)
 Italy

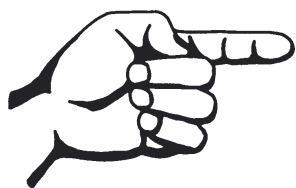
THIS FORKLIFT TRUCK COMPLIES
 WITH:
 ANSI/ITSDF B56.6-2011
 CSA B335-04



Serial label
 (located inside chassis)



Serial number stamp



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Safety Rules



Danger

Failure to obey the instructions and safety rules in this manual and the appropriate Operator's Manual on your machine will result in death or serious injury.

Many of the hazards identified in the Operator's Manual are also safety hazards when maintenance and repair procedures are performed.

Do Not Perform Maintenance Unless:

- ☑ You are trained and qualified to perform maintenance on this machine.
- ☑ You read, understand and obey:
 - manufacturer's instructions and safety rules
 - employer's safety rules and worksite regulations
 - applicable governmental regulations
- ☑ You have the appropriate tools, lifting equipment and a suitable workshop.

SAFETY RULES

Personal Safety

Any person working on or around a machine must be aware of all known safety hazards. Personal safety and the continued safe operation of the machine should be your top priority.



Read each procedure thoroughly. This manual and the decals on the machine, use signal words to identify the following:



Safety alert symbol—used to alert personnel to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, may cause minor or moderate injury.



Indicates a potentially hazardous situation which, if not avoided, may result in property damage.



Be sure to wear protective eye wear and other protective clothing if the situation warrants it.



Be aware of potential crushing hazards such as moving parts, free swinging or unsecured components when lifting or placing loads. Always wear approved steel-toed shoes.

Workplace Safety



Be sure to keep sparks, flames and lighted tobacco away from flammable and combustible materials like battery gases and engine fuels. Always have an approved fire extinguisher within easy reach.



Be sure that all tools and working areas are properly maintained and ready for use. Keep work surfaces clean and free of debris that could get into machine components and cause damage.



Be sure any forklift, overhead crane or other lifting or supporting device is fully capable of supporting and stabilizing the weight to be lifted. Use only chains or straps that are in good condition and of ample capacity.



Be sure that fasteners intended for one time use (i.e., cotter pins and self-locking nuts) are not reused. These components may fail if they are used a second time.



Be sure to properly dispose of old oil or other fluids. Use an approved container. Please be environmentally safe.



Be sure that your workshop or work area is properly ventilated and well lit.

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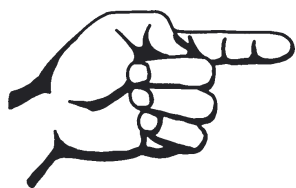
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Specifications

Machine Specifications

Fluid capacities	
Fuel tank	47 gallons 180 liters
Hydraulic tank	48 gallons 182 liters
Hydraulic system (including tank)	77 gallons 290 liters

For operational specifications, refer to the Operator's Manual.

Tires and wheels	
Tire size	17.5 x 25
Tire ply rating	22
Weight, rough terrain tire (air filled)	427 lbs 194 kg
Weight, rough terrain tire (foam filled)	1275 lbs 578 kg
Tire pressure (models with air-filled tires)	87 psi 6 bar
Lug nut torque	465 ft-lbs 630 Nm
Lug pattern	10 x 13.189
Wheel diameter	53 in 135 cm
Wheel width	18 in 46.5 cm

Continuous improvement of our products is a Genie policy. Product specifications are subject to change without notice.

SPECIFICATIONS

Performance Specifications

Drive speed, maximum	18 mph 29 km/h
Draw bar pull	22500 lbs 10206 kg
Lift capacity, maximum	15000 lbs 6804 kg

Boom function speeds, maximum

Boom up	19 seconds
Boom down	15 seconds
Boom extend	17 seconds
Boom retract	14 seconds
Fork tilt up	7 seconds
Fork tilt down	7 seconds

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SPECIFICATIONS

Hydraulic Specifications

Hydraulic Oil Specification

Hydraulic oil type	Chevron Rando HD equivalent
Viscosity grade	Multi-viscosity
Viscosity index	200
Cleanliness level, minimum	15/13
Water content, maximum	200 ppm

Chevron Rando HD oil is fully compatible and mixable with Shell Donax TG (Dexron III) oils.

Genie specifications require hydraulic oils which are designed to give maximum protection to hydraulic systems, have the ability to perform over a wide temperature range, and the viscosity index should exceed 140. They should provide excellent antiwear, oxidation, corrosion inhibition, seal conditioning, and foam and aeration suppression properties.

Optional fluids

Biodegradable	Petro Canada Environ MV46 Statoil Hydra Way Bio Pa 32 BP Biohyd SE-S
Fire resistant	UCON Hydroluble HP-5046 Quintolubric 822
Mineral based	Shell Tellus S2 V 32 Shell Tellus S2 V 46 Chevron Aviation A Eni Arnica 32

NOTICE

Continued use of Chevron Aviation A hydraulic fluid when ambient temperatures are consistently above 32°F / 0°C may result in component damage.

Note: Use Chevron Aviation A hydraulic fluid when ambient temperatures are consistently below 0°F / -17°C.

Note: Use Shell Tellus T46 hydraulic oil when oil temperatures consistently exceed 205°F / 96°C.

Genie specifications require additional equipment and special installation instructions for the approved optional fluids. Consult the Genie Service Department before use.

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SPECIFICATIONS

Hydraulic Components Specifications

Boom and Steering Functions Pump

Type:	variable displacement piston pump
Displacement	0 to 3.7 cu in 0 to 60 cc
Flow rate @ 2200 rpm	35 gpm 132 L/min
Pump pressure, maximum (measured at test port TP1)	3915 psi 270 bar
Pressure compensator (measured at test port TP1)	3915 psi 270 bar
Stand-by pressure (measured at test port TP5)	290 psi 20 bar

Auxiliary Gear Pump

Type:	fixed displacement gear pump
Displacement	1.53 cu in 25 cc
Flow rate @ 2200 rpm	15 gpm 56 L/min
Pump pressure, maximum (measured at test port TP2)	3625 psi 250 bar
Relief valve pressure, maximum (measured at test port TP2)	3625 psi 250 bar

Hydraulic Oil Radiator Fan Pump

Type:	fixed displacement gear pump
Displacement (Deutz Configuration)	0.73 cu in 12 cc
Flow rate @ 2200 rpm (Deutz Configuration)	8 gpm 31 L/min
Displacement (Perkins Configuration)	0.98 cu in 16 cc
Flow rate @ 2200 rpm (Perkins Configuration)	9 gpm 35 L/min

Hydraulic Oil Radiator Fan Pump

Pump pressure, maximum	1740 psi 120 bar
Relief valve pressure, maximum	1740 psi 120 bar

Hydrostatic Transmission Pump

Type:	variable displacement piston pump
Displacement	0 to 5.5 cu in 0 to 90 cc
Flow rate @ 2200 rpm	52 gpm 198 L/min
Pump pressure, maximum (measured at test port TP4)	6450 psi 445 bar
Relief valve pressure, maximum (measured at test port TP4)	6890 psi 475 bar
Pump charge relief valve pressure, maximum (measured at test port TP3)	290 psi 20 bar

Hydrostatic Transmission Motor

Type:	variable displacement piston motor
Displacement	0 to 6.5 cu in 0 to 107 cc
Flow rate @ 2200 rpm	52 gpm 198 L/min
Motor pressure, maximum (measured at test port TP4)	6450 psi 445 bar
Relief valve pressure, maximum (measured at test port TP4)	6890 psi 475 bar

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SPECIFICATIONS

Function Manifold Specifications

Function Manifold	
System relief valve pressure, maximum (measured at test port TP1)	3770 psi 260 bar
Fork tilt relief valve pressure, maximum	4060 psi 280 bar
Secondary Function Valves	
Steer relief valve pressure, maximum	2610 psi 180 bar
Parking brake relief valve pressure, maximum (measured at test port TP3)	406 psi 28 bar
Diff lock relief valve pressure, maximum (measured at test port TP3)	406 psi 28 bar
Rear lock-up relief valve pressure, maximum (measured at test port TP3)	406 psi 28 bar
Sway relief valve pressure, maximum (measured at test port TP2)	3335 psi 230 bar
Auxiliary line relief valve pressure, maximum (measured at test port TP3)	3335 psi 230 bar
Transmission gearbox speed shifting relief valve pressure, maximum (measured at test port TP3)	406 psi 28 bar

Air Conditioner Refrigerant Specifications

System Full Charge	
R134a	2 lbs 3 oz

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SPECIFICATIONS

Perkins 1204E-E44TA Engine

Displacement	269 cu in 4.4 liters
Number of cylinders	4
Bore and stroke	4.13 x 5 inches 105 x 127 mm
Horsepower	
Peak Torque	
Firing order	1 - 3 - 4 - 2
Compression ratio	16.5:1
Combustion	
Governor	
Low idle Frequency	800 rpm
High idle Frequency	2200 rpm
Lubrication system	
Oil pressure (hot @ 2300 rpm)	
Minimum pressure	
Oil capacity (including filter)	
Oil viscosity requirements	
Units ship with 15W-40 API CJ4 low ash oil. Extreme operating temperatures may require the use of alternative engine oils. For oil requirements, refer to the Engine Operation and Maintenance Manual on your machine.	

Fuel requirements

For fuel requirements, refer to the engine Operation Manual on your machine.

Fuel injection pressure**Engine coolant****Capacity**

Type	TEREX PRO COOL Ethylene Glycol (ASTM D3306, ASTM D1384, FORD, G.M., FIAT)
------	---

Alternator

Output	12 V, 120 Amp
--------	---------------

Starter Motor

Relay max	68 A
Relay continuous	20 A
Cranking speed	130 rpm

Glow Plugs

Initial load (0-4 sec)	82 A (EA)
Continuous load (>4 sec)	64 A (EA)

Battery

Type	12V DC
Group	C31
Quantity	1
Cold cranking ampere @ 0°F	1000 A
Reserve capacity @ 25A rate	200 minutes

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SPECIFICATIONS

Deutz TCD 4.1 L4 Engine

Displacement	4038 cm ³
Number of cylinders	4
Bore and stroke	4 x 5 inches 101 x 126 mm
Horsepower	154 hp @ 2200 rpm 115 kW @ 2200 rpm
Peak Torque	826 lb-ft @ 1600 rpm 609 Nm @ 1600 rpm
Firing order	1 - 3 - 4 - 2
Compression ratio	18:1
Governor	Electronic
Low idle	920 rpm
Frequency	15.34 Hz
High idle	2300 rpm
Frequency	38.34 Hz
Lubrication system	
Minimum oil pressure	11.6 psi 0.8 bar
Maximum oil capacity (including filter)	12.1 quarts 11.5 liters
Oil viscosity requirements	
Units ship with 15W-40 API CJ4 low ash oil. Extreme operating temperatures may require the use of alternative engine oils. For oil requirements, refer to the Engine Operation and Maintenance Manual on your machine.	

Fuel requirements

For fuel requirements, refer to the engine Operation Manual on your machine.

Fuel injection pressure**Engine coolant**

Capacity

Type	TEREX PRO COOL Ethylene Glycol (ASTM D3306, ASTM D1384, FORD, G.M, FIAT)
------	---

Alternator

Output

Starter Motor

Normal load

Relay max

Relay continuous

Cranking speed

Glow Plugs

Initial load (0-10 sec)

Continuous load (>10 sec)

Battery

Type	12V DC
Group	C31
Quantity	1
Cold cranking ampere @ 0°F	1000A
Reserve capacity @ 25A rate	200 minutes

Continuous improvement of our products is a Genie policy. Product specifications are subject to change without notice.

SPECIFICATIONS

Dana Integral Gear Box Shift on Fly

Transmission Type	Hydrostatic with Mechanical Gear, 2 speed
Transmission ratio - 1 st speed	4.53
Transmission ratio - 2 nd speed	1.62
Lubrication	
Oil capacity, gear box	1.69 quarts 1.6 liters
Oil viscosity requirements	
Units ship with SAE 85W90 API GL4. Refer to the <i>Dana Integral Gear Box Shift on Fly Maintenance and Repair Manual</i> (Dana part number MO367110).	
Dana Integral Gear Box Shift on Fly Maintenance and Repair Manual	
Genie part number	57.4700.0007

Dana Axle

Steering	Integrated steer cylinder
Joints	Heavy duty double U-joints
Steering angle, maximum	35 °
Front Axle Lubrication	
Front differential	22.19 quarts 21 liters
Axle planetary end (each)	2 quarts 1.9 liters
Rear Axle Lubrication	
Rear differential	21.13 quarts 20 liters
Axle planetary end (each)	1.95 quarts 1.85 liters
Oil viscosity requirements	
Differential	API GL4 (MIL L-2105)
Planetary ends	API GL4 (MIL L-2105)
For additional axle information, refer to the <i>Dana Axle Maintenance and Repair Manual</i> (Dana part number MO213S20).	
Dana Axle Maintenance and Repair Manual	
Genie part number	57.4700.0008 (Genie Instructions Library)

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SPECIFICATIONS

Hydraulic Hose and Fitting Torque Specifications

Your machine is equipped with Parker Seal-Lok™ ORFS or 37° JIC fittings and hose ends. Genie specifications require that fittings and hose ends be torqued to specification when they are removed and installed or when new hoses or fittings are installed.

Seal-Lok™ Fittings (hose end - ORFS)

SAE Dash size	Torque
-4	10 ft-lbs / 13.6 Nm
-6	30 ft-lbs / 40.7 Nm
-8	40 ft-lbs / 54.2 Nm
-10	60 ft-lbs / 81.3 Nm
-12	85 ft-lbs / 115 Nm
-16	110 ft-lbs / 150 Nm
-20	140 ft-lbs / 190 Nm
-24	180 ft-lbs / 245 Nm

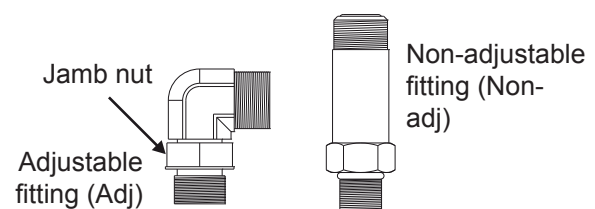
JIC 37° Fittings (swivel nut or hose connection)

SAE Dash size	Thread Size	Flats
-4	$\frac{7}{16}$ -20	2
-6	$\frac{9}{16}$ -18	1 $\frac{1}{4}$
-8	$\frac{3}{4}$ -16	1
-10	$\frac{7}{8}$ -14	1
-12	1 $\frac{1}{16}$ -12	1
-16	1 $\frac{5}{16}$ -12	1
-20	1 $\frac{5}{8}$ -12	1
-24	1 $\frac{7}{8}$ -12	1

SAE O-ring Boss Port

(tube fitting - installed into Aluminum)
(all types)

SAE Dash size	Torque
-4	14 ft-lbs / 19 Nm
-6	23 ft-lbs / 31.2 Nm
-8	36 ft-lbs / 54.2 Nm
-10	62 ft-lbs / 84 Nm
-12	84 ft-lbs / 114 Nm
-16	125 ft-lbs / 169.5 Nm
-20	151 ft-lbs / 204.7 Nm
-24	184 ft-lbs / 249.5 Nm



SAE O-ring Boss Port

(tube fitting - installed into Steel)

SAE Dash size		Torque
-4	ORFS / 37° (Adj)	15 ft-lbs / 20.3 Nm
	ORFS (Non-adj)	26 ft-lbs / 35.3 Nm
	37° (Non-adj)	22 ft-lbs / 30 Nm
-6	ORFS (Adj / Non-adj)	35 ft-lbs / 47.5 Nm
	37° (Adj / Non-adj)	29 ft-lbs / 39.3 Nm
-8	ORFS (Adj / Non-adj)	60 ft-lbs / 81.3 Nm
	37° (Adj / Non-adj)	52 ft-lbs / 70.5 Nm
-10	ORFS (Adj / Non-adj)	100 ft-lbs / 135.6 Nm
	37° (Adj / Non-adj)	85 ft-lbs / 115.3 Nm
-12	(All types)	135 ft-lbs / 183 Nm
-16	(All types)	200 ft-lbs / 271.2 Nm
-20	(All types)	250 ft-lbs / 339 Nm
-24	(All types)	305 ft-lbs / 413.5 Nm

SPECIFICATIONS

Torque Procedure

Seal-Lok™ fittings

- 1 Replace the O-ring. The O-ring must be replaced anytime the seal has been broken. The O-ring cannot be re-used if the fitting or hose end has been tightened beyond finger tight.

Note: The O-rings used in the Parker Seal Lok™ fittings and hose ends are custom-size O-rings. They are not standard SAE size O-rings. They are available in the O-ring field service kit (Genie part number 49612).

- 2 Lubricate the O-ring before installation.
- 3 Be sure that the face seal O-ring is seated and retained properly.
- 4 Position the tube and nut squarely on the face seal end of the fitting and tighten the nut finger tight.
- 5 Tighten the nut or fitting to the appropriate torque per given size as shown in the table.
- 6 Operate all machine functions and inspect the hoses and fittings and related components to confirm that there are no leaks.

JIC 37° fittings

- 1 Align the tube flare (hex nut) against the nose of the fitting body (body hex fitting) and tighten the hex nut to the body hex fitting to hand-tight, approximately 30 in-lbs / 3.4 Nm.
- 2 Make a reference mark on one of the flats of the hex nut, and continue it on to the body hex fitting with a permanent ink marker. Refer to Figure 1.

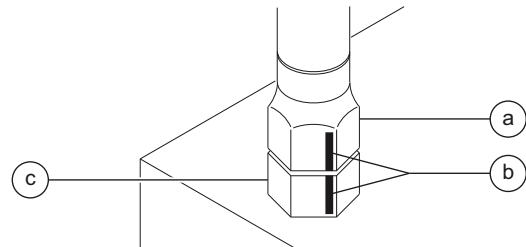


Figure 1

- a hex nut
- b reference mark
- c body hex fitting

- 3 Working clockwise on the body hex fitting, make a second mark with a permanent ink marker to indicate the proper tightening position. Refer to Figure 2.

Note: Use the JIC 37° Fittings table on the previous page to determine the correct number of flats for the proper tightening position.

Note: The marks indicate that the correct tightening positions have been determined. Use the second mark on the body hex fitting to properly tighten the joint after it has been loosened.

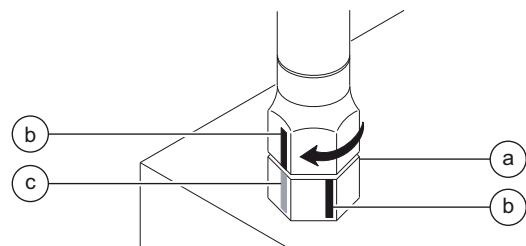


Figure 2

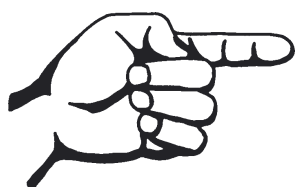
- a body hex fitting
- b reference mark
- c second mark

- 4 Tighten the hex nut until the mark on the hex nut is aligned with the second mark on the body hex fitting.
- 5 Operate all machine functions and inspect the hoses and fittings and related components to confirm that there are no leaks.

SPECIFICATIONS

SAE FASTENER TORQUE CHART											
•This chart is to be used as a guide only unless noted elsewhere in this manual•											
SIZE	THREAD	Grade 5 				Grade 8 				A574 High Strength Black Oxide Bolts	
		LUBED		DRY		LUBED		DRY		LUBED	
		in-lbs	Nm	in-lbs	Nm	in-lbs	Nm	in-lbs	Nm	in-lbs	Nm
1/4	20	80	9	100	11.3	110	12.4	140	15.8	130	14.7
	28	90	10.1	120	13.5	120	13.5	160	18	140	15.8
		LUBED		DRY		LUBED		DRY		LUBED	
		ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm
5/16	18	13	17.6	17	23	18	24	25	33.9	21	28.4
	24	14	19	19	25.7	20	27.1	27	36.6	24	32.5
3/8	16	23	31.2	31	42	33	44.7	44	59.6	38	51.5
	24	26	35.2	35	47.4	37	50.1	49	66.4	43	58.3
7/16	14	37	50.1	49	66.4	50	67.8	70	94.7	61	82.7
	20	41	55.5	55	74.5	60	81.3	80	108.4	68	92.1
1/2	13	57	77.3	75	101.6	80	108.4	110	149	93	126
	20	64	86.7	85	115	90	122	120	162	105	142
9/16	12	80	108.4	110	149	120	162	150	203	130	176
	18	90	122	120	162	130	176	170	230	140	189
5/8	11	110	149	150	203	160	217	210	284	180	244
	18	130	176	170	230	180	244	240	325	200	271
3/4	10	200	271	270	366	280	379	380	515	320	433
	16	220	298	300	406	310	420	420	569	350	474
7/8	9	320	433	430	583	450	610	610	827	510	691
	14	350	474	470	637	500	678	670	908	560	759
1	8	480	650	640	867	680	922	910	1233	770	1044
	12	530	718	710	962	750	1016	990	1342	840	1139
1 1/8	7	590	800	790	1071	970	1315	1290	1749	1090	1477
	12	670	908	890	1206	1080	1464	1440	1952	1220	1654
1 1/4	7	840	1138	1120	1518	1360	1844	1820	2467	1530	2074
	12	930	1260	1240	1681	1510	2047	2010	2725	1700	2304
1 1/2	6	1460	1979	1950	2643	2370	3213	3160	4284	2670	3620
	12	1640	2223	2190	2969	2670	3620	3560	4826	3000	4067

METRIC FASTENER TORQUE CHART																		
•This chart is to be used as a guide only unless noted elsew here in this m anual•																		
Size (m m)	C lass 4.6 					C lass 8.8 					C lass 10.9 				C lass 12.9 			
	LUBED		DRY			LUBED		DRY			LUBED		DRY		LUBED		DRY	
	in-lbs	Nm	in-lbs	Nm		in-lbs	Nm	in-lbs	Nm		in-lbs	Nm	in-lbs	Nm	in-lbs	Nm	in-lbs	Nm
5	16	1.8	21	2.4		41	4.63	54	6.18		58	6.63	78	8.84	68	7.75	91	10.3
6	19	3.05	36	4.07		69	7.87	93	10.5		100	11.3	132	15	116	13.2	155	17.6
7	45	5.12	60	6.83		116	13.2	155	17.6		167	18.9	223	25.2	195	22.1	260	29.4
	LUBED		DRY			LUBED		DRY			LUBED		DRY		LUBED		DRY	
	ft-lbs	Nm	ft-lbs	Nm		ft-lbs	Nm	ft-lbs	Nm		ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm
8	5.4	7.41	7.2	9.88		14	19.1	18.8	25.5		20.1	27.3	26.9	36.5	23.6	32	31.4	42.6
10	10.8	14.7	14.4	19.6		27.9	37.8	37.2	50.5		39.9	54.1	53.2	72.2	46.7	63.3	62.3	84.4
12	18.9	25.6	25.1	34.1		48.6	66	64.9	88		69.7	94.5	92.2	125	81	110	108	147
14	30.1	40.8	40	54.3		77.4	105	103	140		110	150	147	200	129	175	172	234
16	46.9	63.6	62.5	84.8		125	170	166	226		173	235	230	313	202	274	269	365
18	64.5	87.5	86.2	117		171	233	229	311		238	323	317	430	278	377	371	503
20	91	124	121	165		243	330	325	441		337	458	450	610	394	535	525	713
22	124	169	166	225		331	450	442	600		458	622	612	830	536	727	715	970
24	157	214	210	285		420	570	562	762		583	791	778	1055	682	925	909	1233



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Scheduled Maintenance Procedures



Observe and Obey:

- Maintenance inspections shall be completed by a person trained and qualified on the maintenance of this machine.
- Scheduled maintenance inspections shall be completed daily, quarterly, semi-annually, annually and every 2 years as specified on the Maintenance Inspection Report. The frequency and extent of periodical examinations and tests may also depend on national regulations.

⚠ WARNING Failure to perform each procedure as presented and scheduled could result in death, serious injury or substantial damage.

- Immediately tag and remove from service a damaged or malfunctioning machine.
- Repair any machine damage or malfunction before operating the machine.
- Use only Genie approved replacement parts.
- Machines that have been out of service for a period longer than 3 months must complete the quarterly inspection.
- Unless otherwise specified, perform each maintenance procedure with the machine in the following configuration:
 - Machine parked on a firm, level surface
 - Boom in the stowed position
 - Key switch in the off position with the key removed
 - Wheels chocked

About This Section

This section contains detailed procedures for each scheduled maintenance inspection.

Each procedure includes a description, safety warnings and step-by-step instructions.

Symbols Legend



Safety alert symbol—used to alert personnel to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, may cause minor or moderate injury.



Indicates a potentially hazardous situation which, if not avoided, may result in property damage.

⦿ Indicates that a specific result is expected after performing a series of steps.

✗ Indicates that an incorrect result has occurred after performing a series of steps.

SCHEDULED MAINTENANCE PROCEDURES

Maintenance Symbols Legend

Note: The following symbols have been used in this manual to help communicate the intent of the instructions. When one or more of the symbols appear at the beginning of a maintenance procedure, it conveys the meaning below.



Indicates that tools will be required to perform this procedure.



Indicates that new parts will be required to perform this procedure.



Indicates that a cold engine will be required to perform this procedure.



Indicates that a warm engine will be required to perform this procedure.



Indicates that dealer service will be required to perform this procedure.

Pre-delivery Preparation Report

The pre-delivery preparation report contains checklists for each type of scheduled inspection.

Make copies of the *Pre-delivery Preparation* report to use for each inspection. Store completed forms as required.

Maintenance Schedule

There are five types of maintenance inspections that must be performed according to a schedule—daily, quarterly, semi-annually, annually, and every two years. The *Scheduled Maintenance Procedures Section* and the *Maintenance Inspection Report* have been divided into five subsections—A, B, C, D, and E. Use the following chart to determine which group(s) of procedures are required to perform a scheduled inspection.

<i>Inspection</i>	<i>Checklist</i>
Daily or every 8 hours	A
Quarterly or every 250 hours	A + B
Semi-annually or every 500 hours	A + B + C
Annually or every 1000 hours	A + B + C + D
Two years or every 2000 hours	A + B + C + D + E

Maintenance Inspection Report

The maintenance inspection report contains checklists for each type of scheduled inspection.

Make copies of the *Maintenance Inspection Report* to use for each inspection. Maintain completed forms for a minimum of 4 years or in compliance with your employer, job site and governmental regulations and requirements.

Pre-Delivery Preparation

Fundamentals

It is the responsibility of the dealer to perform the Pre-delivery Preparation.

The Pre-delivery Preparation is performed prior to each delivery. The inspection is designed to discover if anything is apparently wrong with a machine before it is put into service.

A damaged or modified machine must never be used.

If damage or any variation from factory delivered condition is discovered, the machine must be tagged and removed from service.

Repairs to the machine may only be made by a qualified service technician, according to the manufacturer's specifications.

Scheduled maintenance inspections shall be performed by qualified service technicians, according to the manufacturer's specifications and the requirements listed in the responsibilities manual.

Instructions

Use the operator's manual on your machine.

The Pre-delivery Preparation consists of completing the Pre-operation Inspection, the Maintenance items and the Function Tests.

Use this form to record the results. Place a check in the appropriate box after each part is completed.

Follow the instructions in the operator's manual.

If any inspection receives an N, remove the machine from service, repair and reinspect it. After repair, place a check in the R box.

Legend

Y = yes, completed

N = no, unable to complete

R = repaired

Comments

<i>Pre-Delivery Preparation</i>	<i>Y</i>	<i>N</i>	<i>R</i>
Pre-operation inspection completed			
Maintenance items completed			
Function tests completed			

Model

Serial number

Date

Machine owner

Inspected by (print)

Inspector signature

Inspector title

Inspector company



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(605) 882-4000

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Maintenance Inspection Report

Model
Serial number
Date
Hour meter
Machine owner
Inspected by (print)
Inspector signature
Inspector title
Inspector company

Instructions

- Make copies of this report to use for each inspection.
- Select the appropriate checklist(s) for the type of inspection to be performed.

☐	Daily or 8 hours	
☐	Inspection:	A
☐	Quarterly or 250 hours	
☐	Inspection:	A+B
☐	Semi-annually or 500 hours	
☐	Inspection:	A+B+C
☐	Annually or 1000 hours	
☐	Inspection:	A+B+C+D
☐	2 Years or 2000 hours	
☐	Inspection:	A+B+C+D+E

- Place a check in the appropriate box after each inspection procedure is completed.
- Use the step-by-step procedures in this section to learn how to perform these inspections.
- If any inspection receives an "N", tag and remove the machine from service, repair and re-inspect it. After repair, place a check in the "R" box.

Legend

Y = yes, acceptable
N = no, remove from service
R = repaired

Checklist A		Y	N	R
A-1	Manuals and decals			
A-2	Pre-operation inspect			
A-3	Function tests			
A-4	Lubricate the boom			
A-5	Engine maintenance - All models			
A-6	Safety devices			

Perform after 40 hours:

A-7	30 day service			
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Perform after 100 hours:

A-8	Gearbox maintenance			
A-9	Axle maintenance			

Perform every 200 hours:

A-10	Axle maintenance			
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Checklist B		Y	N	R
B-1	Electrical wiring			
B-2	Gearbox maintenance			
B-3	Exhaust system			
B-4	Engine air filter			
B-5	Tires and wheels			
B-6	Hydraulic oil			
B-7	Boom wear pads			

Checklist C		Y	N	R
C-1	Engine maintenance - All models			
C-2	Engine maintenance - Perkins models			
C-3	Inspect and lubricate sequencing chains			

Perform every 800 hours:

C-4	Axle maintenance			
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Checklist D		Y	N	R
D-1	Forks			
D-2	Sequencing chains			

Checklist D		Y	N	R
D-3	Hydraulic return filter			
D-4	Gearbox maintenance			
D-5	Engine maintenance - All models			
D-6	Engine maintenance - Deutz models			
D-7	Axle maintenance			

Perform every 1500 hours:

D-8	Engine maintenance - Perkins model			
-----	------------------------------------	--	--	--

Checklist E		Y	N	R
E-1	Hydraulic oil			
E-2	Engine maintenance - All models			
E-3	Engine maintenance - Deutz models			

Perform every 3000 hours:

E-4	Engine maintenance - Perkins models			
-----	-------------------------------------	--	--	--

Perform every 3000 hours or 2 years:

E-5	Engine maintenance - Perkins models			
-----	-------------------------------------	--	--	--

Perform every 4000 hours:

E-6	Engine maintenance - Perkins models			
-----	-------------------------------------	--	--	--

Perform every 4500 hours:

E-7	Engine maintenance - Deutz models			
-----	-----------------------------------	--	--	--

Perform every 6000 hours:

E-8	Engine maintenance - Deutz models			
-----	-----------------------------------	--	--	--

Perform every 8000 hours:

E-9	Engine maintenance - Deutz models			
-----	-----------------------------------	--	--	--

Perform every 12000 hours:

E-10	Engine maintenance - Perkins models			
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Comments

Checklist A Procedures

A-1 Inspect the Manuals and Decals

Genie specifications require that this procedure be performed every 8 hours or daily, whichever comes first.

Maintaining the operator's and safety manuals in good condition is essential to safe machine operation. Manuals are included with each machine and should be stored in the container provided in the operator's compartment. An illegible or missing manual will not provide safety and operational information necessary for a safe operating condition.

In addition, maintaining all of the safety and instructional decals in good condition is mandatory for safe machine operation. Decals alert operators and personnel to the many possible hazards associated with using this machine. They also provide users with operation and maintenance information. An illegible decal will fail to alert personnel of a procedure or hazard and could result in unsafe operating conditions.

- 1 Check to make sure that the operator's and safety manuals are present and complete in the storage container in the operator's compartment.
 - 2 Examine the pages of each manual to be sure that they are legible and in good condition.
- ⦿ Result: The operator's manual is appropriate for the machine and all manuals are legible and in good condition.

- ✗ Result: The operator's manual is not appropriate for the machine or all manuals are not in good condition or is illegible. Remove the machine from service until the manual is replaced.
- 3 Open the operator's manual to the decals inspection section. Carefully and thoroughly inspect all decals on the machine for legibility and damage.
- ⦿ Result: The machine is equipped with all required decals, and all decals are legible and in good condition.
- ✗ Result: The machine is not equipped with all required decals, or one or more decals are illegible or in poor condition. Remove the machine from service until the decals are replaced.
- 4 Always return the manuals to the storage container after use.

Note: Contact your authorized Genie distributor or Genie Industries if replacement manuals or decals are needed.

CHECKLIST A PROCEDURES

A-2 Perform Pre-operation Inspection

Genie specifications require that this procedure be performed every 8 hours or daily, whichever comes first.

Completing a Pre-operation Inspection is essential to safe machine operation. The Pre-operation Inspection is a visual inspection performed by the operator prior to each work shift. The inspection is designed to discover if anything is apparently wrong with a machine before the operator performs the function tests. The Pre-operation Inspection also serves to determine if routine maintenance procedures are required.

Complete information to perform this procedure is available in the appropriate operator's manual. Refer to the Operator's Manual on your machine.

A-3 Perform Function Tests

Genie specifications require that this procedure be performed every 8 hours or daily, whichever comes first.

Completing the function tests is essential to safe machine operation. Function tests are designed to discover any malfunctions before the machine is put into service. A malfunctioning machine must never be used. If malfunctions are discovered, the machine must be tagged and removed from service.

Complete information to perform this procedure is available in the appropriate operator's manual. Refer to the Operator's Manual on your machine.

CHECKLIST A PROCEDURES

A-4 Lubricate the Boom



Genie specifications require that this procedure be performed every 8 hours or daily, whichever comes first.

Greasing the specified locations is essential for good machine performance and service life. Operating the machine with little or no grease may cause the machine to perform poorly and continued use may cause component damage.

- 1 Fully extend and raise the boom, then retract the boom, checking to insure it operates smoothly. There should be a light film of lubricant on wear pad contact surfaces.
- ⦿ Result: Boom operates smoothly and a thin film of lubricant is visible. Proceed to step 5.
- ✗ Result: Boom does not extend or retract smoothly and no lubricant is visible on wear pad contact surfaces. Proceed to step 2.
- 2 Apply a thin layer of grease to the underside of the number 3 boom tube where it makes contact with the number 2 boom tube lower wear pads.
- 3 Apply a thin layer of grease to the underside of the number 2 boom tube where it makes contact with the number 1 boom tube lower wear pads.

- 4 Lubricate the top and side boom tube wear pads.
- 5 Return the boom to the stowed position.
- 6 Reach the pivot end of the boom and lubricate the chain return pulley using a grease gun.

Grease Specification

PTFE INTERFLON FIN GREASE LS 2

Genie part number	09.4693.0000
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CHECKLIST A PROCEDURES

A-5**Perform Engine Maintenance -
All Models**

Note: Engine specifications require that this procedure be performed every 8 hours or daily, whichever comes first.

Perkins 1204E-E44TA**Coolant level - check/add****Engine oil level - check****Fuel system filter/water separator - drain****Walk-Around inspection****Deutz TCD 4.1 L4****Lubricating oil level - check/add****Coolant level - check/add****Suction air filter/dry air filter - check****Visual inspection**

Required maintenance procedures and additional engine information is available in the *Perkins 1204E-E44TA Operation and Maintenance Manual* (Perkins part number SEBU8605-01), *Deutz TCD 4.1 L4 Operation and Maintenance Manual* (Deutz part number 0312 4546).

Perkins 1204E-E44TA Operation and Maintenance Manual

Genie part number	57.4700.0009
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Deutz TCD 4.1 L4 Operation and Maintenance Manual

Genie part number	57.4700.0004
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A-6**Safety Devices****1 Emergency Stop button**

- To check the efficiency of this pushbutton, simply press it down during a movement. The pressure of the pushbutton shall cause the movement to stop and the engine to shut down.

2 Pressure Switch On The Parking Brake

- Engage the parking brake and start the engine.
- The parking brake warning light should come on.
- Attempt to move with the machine. The machine must not move.

CHECKLIST A PROCEDURES

A-7**Perform 30 Day Service**

The 30 day maintenance procedure is a one-time sequence of procedures to be performed after the first 30 days or 40 hours of usage. After this interval, refer to the maintenance checklists for continued scheduled maintenance.

- 1 Perform the following maintenance procedures:
 - B-5 Inspect the Tires, Wheels and Lug Nut Torque
 - D-3 Replace the Hydraulic Tank Return Filter Element
 - Check Belt Tension
 - Check The Engine Mounts
 - Check Hose Clamps

A-8**Perform Gear Box Maintenance**

Note: Gear box specifications require that this procedure be performed after 100 hours.

Lubricating oil - change

Required maintenance procedures and additional gear box information is available in the *Dana Integral Gear Box Shift in Fly Maintenance and Repair Manual* (Dana part number MO367I10).

Dana Integral Gear Box Shift on Fly Maintenance and Repair Manual

Genie part number 57.4700.0007
(Genie Instructions Library)

CHECKLIST A PROCEDURES

A-9**Perform Axle Maintenance**

Note: Axle specifications require that this procedure be performed after 100 hours.

Differential lubricating oil - change
Planetary reduction lubricating oil - change
Negative brake - adjust

Required maintenance procedures and additional axle information is available in the *Dana Axle Maintenance and Repair Manual* (Dana part number MO213S20).

Dana Axle Maintenance and Repair Manual

Genie part number 57.4700.0008
(Genie Instructions Library)

A-10**Perform Axle Maintenance**

Note: Axle specifications require that this procedure be performed every 200 hours.

Planetary reduction lubricating oil - check/add

Required maintenance procedures and additional axle information is available in the *Dana Axle Maintenance and Repair Manual* (Dana part number MO213S20).

Dana Axle Maintenance and Repair Manual

Genie part number 57.4700.0008
(Genie Instructions Library)

Checklist B Procedures

B-1

Inspect the Electrical Wiring



Genie requires that this procedure be performed every 250 hours or quarterly, whichever comes first.

Maintaining electrical wiring in good condition is essential to safe operation and good machine performance. Failure to find and replace burnt, chafed, corroded or pinched wires could result in unsafe operating conditions and may cause component damage.

⚠ WARNING Electrocution/burn hazard. Contact with hot or live circuits could result in death or serious injury. Remove all rings, watches and other jewelry.

- 1 Inspect the following areas for burnt, chafed, corroded and loose wires:
 - Inside of the operator's compartment
 - Underside of the chassis
 - Boom assembly
- 2 Inspect for a liberal coating of dielectric grease in the following locations:
 - All harness connectors
- 3 Start the engine and raise the boom so there is enough room to access and remove all the covers attached to the chassis.

- 4 Attach a lifting strap from an overhead crane to the boom. Support the boom. Do not apply any lifting pressure.

- 5 Remove all engine covers, hydraulic tank covers and chassis covers.

⚠ DANGER Crushing hazard. Death or serious injury could result if the boom should unexpectedly fall while working underneath the boom. Do not stand or work beneath a boom that is not properly supported.

- 6 Inspect the following areas for burnt, chafed, corroded, pinched and loose wires:
 - Engine
 - Transmission
 - Manifolds
 - Chassis
- 7 Inspect for a liberal coating of dielectric grease in all connections between the engine, transmission and the operator's compartment.
- 8 Install all covers removed in step 5.
- 9 Remove the lifting strap from the overhead crane.
- 10 Start the engine and lower the boom to the stowed position. Turn the machine off.

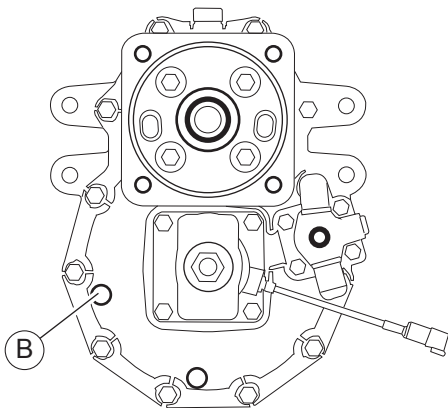
CHECKLIST B PROCEDURES

B-2 Gear Box Oil Level



Genie requires that this procedure be performed every 300-400 hours or quarterly, whichever comes first.

- 1 Stop the machine on a level ground and engage the parking brake.
- 2 Clean level plug (B) all around.
- 3 Remove the plug (B) and check if oil is level with the hole.
- 4 When necessary, add new oil through plug (B) until it is level with the hole.
- 5 Refit and tighten the plug (B).



B-3 Check the Exhaust System



Genie requires that this procedure be performed every 250 hours or quarterly, whichever comes first.

Maintaining the exhaust system is essential to good engine performance and service life. Running the engine with a damaged or leaking exhaust system can cause component damage and unsafe operating conditions.

⚠ WARNING Bodily injury hazard. Do not inspect while the engine is running. Remove the key to secure from operation.

⚠ CAUTION Bodily injury hazard. Beware of hot engine components. Contact with hot engine components may cause severe burns.

- 1 Open the engine access cover.
- 2 Be sure that all fasteners are tight.
- 3 Inspect all welds for cracks.
- 4 Inspect for exhaust leaks - i.e., carbon buildup around seams and joints.
- 5 Close the engine access cover.

CHECKLIST B PROCEDURES

B-4 Inspect the Engine Air Filter



Genie requires that this procedure be performed every 250 hours or quarterly, whichever comes first. Perform this procedure more often if dusty conditions exist.

Maintaining the engine air filter in good condition is essential to good engine performance and service life. Failure to perform this procedure can lead to poor engine performance and component damage.

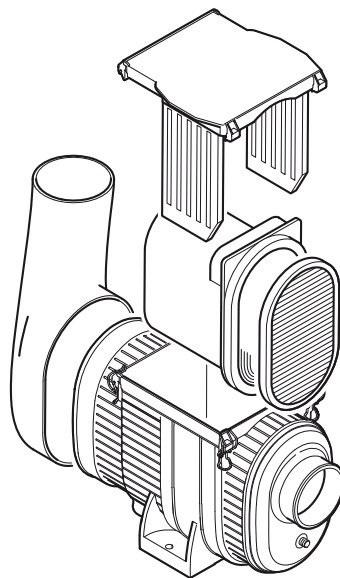
Note: Perform this procedure with the engine off and the parking brake engaged.

- 1 Open engine cover.
- 2 Open the four latches.
- 3 Remove the protection cap.
- 4 Extract the cartridge.
- 5 Clean the filter bowl.

- 6 Dry clean the cartridge (max. pressure: 87 psi / 6 bar).
- 7 Check for cracks in the filtering element.
- 8 Before refitting the cleaned cartridge smear its seal with a thin coat of grease; fit the cartridge and make sure it is properly positioned.
- 9 Refit cap.

NOTICE

As soon as the warning lamp on the cab dashboard switches on, replace the outer element. Never wash the cartridge with water or solvents.



CHECKLIST B PROCEDURES

B-5 Inspect the Tires, Wheels and Lug Nut Torque



Genie requires that the first inspection be performed after the first 50 hours of operation.

Genie requires that this procedure be performed every 250 hours or quarterly, whichever comes first.

Maintaining the tires and wheels in good condition, including proper wheel fastener torque, is essential to safe operation and good performance. Tire and/or wheel failure could result in a machine tip-over. Component damage may also result if problems are not discovered and repaired in a timely fashion.

⚠ WARNING Bodily injury hazard. An overinflated tire can explode and could result in death or serious injury.

⚠ WARNING Tip over hazard. Do not use temporary flat tire repair products.

Note: The tires on some machines are foam filled and do not need air added to them.

- 1 Check all tire treads and sidewalls for cuts, cracks, punctures and unusual wear.
- 2 Check each wheel for damage, bends and cracks.
- 3 Check each lug nut for proper torque. Refer to Section 2, *Specifications*.
- 4 Check the air pressure in each tire. Refer to Section 2, *Specifications*.

B-6 Perform Hydraulic Oil Analysis



Genie requires that this procedure be performed every 250 hours or quarterly, whichever comes first.

Replacement or testing of the hydraulic oil is essential for good machine performance and service life. Dirty oil may cause the machine to perform poorly and continued use may cause component damage. Extremely dirty conditions may require oil changes to be performed more often. Refer to Section 2, *Specifications*.

Note: Before replacing the hydraulic oil, the oil may be tested by an oil distributor for specific levels of contamination to verify that changing the oil is necessary. **If the hydraulic oil is not replaced at the two year inspection, test the oil quarterly. Replace the oil when it fails the test.** See E-1, *Test or Replace the Hydraulic Oil*.

CHECKLIST B PROCEDURES

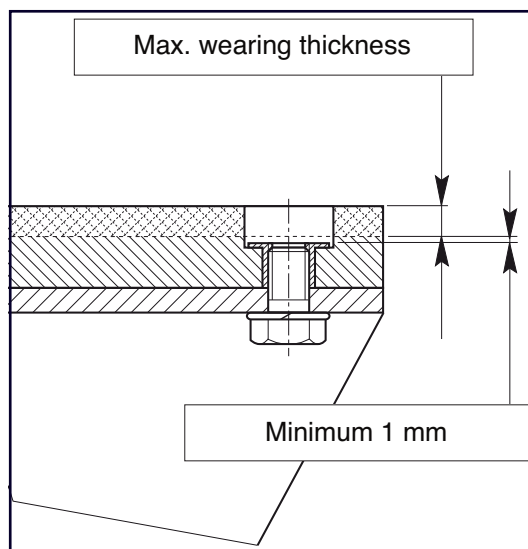
B-7**Check the Boom Wear Pads**

Genie specifications require that this procedure be performed every 250 hours of operation.

Any boom section is fitted with adjustable pads located on the four sides of the profile. These pads are secured to both fixed and mobile part of every section.

All pads can be adjusted by the special shims supplied by GENIE upon demand.

- 1 Extend the boom until the wear pads are accessible.
 - 2 Inspect each pad and ensure that the pad thickness is more than 0.04 inches / 1 mm (see figure).
- ⦿ Result: If thickness is above 0.04 inches / 1 mm, the pad can be re-used.
- ✗ Result: if thickness is less than 0.04 inches / 1 mm, replace the worn pad. Refer to Repair Procedure 1-2, *How to Replace the Boom Wear Pads*.



Boom Wear Pad Screws Tightening Specifications

Screws M10	22 ft-lbs 30 Nm
Screws M10	37 ft-lbs 50 Nm

Checklist C Procedures

C-1

Perform Engine Maintenance - All Models



Note: Engine specifications require that this procedure be performed every 500 hours.

Perkins 1204E-E44TA

Belt - inspect

Engine oil and filter - change

Fan clearance - check

Deutz TCD 4.1 L4

Engine oil and filter - change

(when using Deutz approved oil rated DCQ III or better)

Coolant (additive concentration) - check

Required maintenance procedures and additional engine information is available in the *Perkins 1204E-E44TA Operation and Maintenance Manual* (Perkins part number SEBU8605-01), *Deutz TCD 4.1 L4 Operation and Maintenance Manual* (Deutz part number 0312 4546).

Perkins 1204E-E44TA Operation and Maintenance Manual

Genie part number	57.4700.0009
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Deutz TCD 4.1 L4 Operation and Maintenance Manual

Genie part number	57.4700.0004
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C-2

Perform Engine Maintenance - Perkins Models



Note: Engine specifications require that this procedure be performed every 500 hours or annually.

Perkins 1204E-E44TA

Engine air cleaner element - inspect/replace

Fuel system primary filter (water separator) element - replace

Fuel system secondary filter - replace

Radiator - clean

Required maintenance procedures and additional engine information is available in the *Perkins 1204E-E44TA Operation and Maintenance Manual* (Perkins part number SEBU8605-01),

Perkins 1204E-E44TA Operation and Maintenance Manual

Genie part number	57.4700.0009
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CHECKLIST C PROCEDURES

C-3

Inspect and Lubricate the Sequencing Chains



Genie specifications require that this procedure be performed every 500 hours or semi-annually, whichever comes first. In extremely dusty or hostile environments, it may be necessary to lubricate the chains more often.

Maintaining the sequencing chains in good condition is essential to safe operation and good machine performance. Failure to detect damage to the chains could result in a hazardous operating condition.

Environments in which Genie Telehandlers operate can vary widely from outdoor moisture and temperature extremes, to mildly corrosive or highly corrosive industrial atmospheres, in addition to abrasive exposures such as sand and grit.

In addition, dynamic shock loading can impose abnormal loads above the endurance limit of the chains. Examples of dynamic shock loading are:

- High velocity movement of load, followed by sudden abrupt stops.
- Carrying loads in suspension over irregular surfaces and rough terrain.
- Attempting to "inch" loads which are beyond the rated capacity of the vehicle.

The load cycles and environmental conditions make it impossible to predict chain life. It is therefore necessary to conduct regular inspections.

- 1 Park the machine on a firm, level surface, level the boom and engage the parking brake.
- 2 Fully extend the boom.
- 3 Inspect the chains for the following conditions:
 - Elongation

Note: the pitch of the boom extend chains (boom lower section) shall be 1 inch / 25.4 mm.

Note: the pitch of the boom retract chains (boom upper section) shall be 0.75 inches / 19.05 mm.

Both the extend and retract chains should be measured.

Note: Measurement should be taken in the area where the chain articulates most frequently over the sheaves.

- ⊙ Result: The distance measures 1 inch / 25.4 mm (lower chain) or 0.75 inches / 19.05 mm (upper chain). The chain is within specification. Continue with inspection.
- ✗ Result: The distance is greater than 1 inch / 25.4 mm (lower chain) or 0.75 inches / 19.05 mm. The machine shall be removed from service until the chain is replaced.

Note: The boom chain's normal life expectancy can be expressed as a maximum percent of elongation of 2%.

Note: Please ask the service to know the correct procedure to better understand the maximum percent of chain elongation.

CHECKLIST C PROCEDURES

• Edge wear

Check the chain for wear on the link plate edges caused by running back and forth over the sheave. The maximum reduction of material should not exceed 5%.

• Cracked plates

Check link side plates for any cracks. These are generally a sign of chain fatigue.

• Turning pins

Check the pins. The position of the riveting must be parallel with the top and bottom of the side plate.

If any of these conditions are discovered during inspection, the chain must be replaced.

After inspection and before being returned to service, chains must be lubricated with a quality chain lubricant.

Note: Do not use grease to lubricate chains.

The chain plates should be brushed with a wire brush prior to lubrication to clear the space between the plates.

The lubricant must penetrate the chain joint to prevent wear. Applying lubricant to the external surfaces will prevent rust, but the chains should be articulated to make sure the lubricant penetrates to the working surfaces between the pins and links.

Lubricant may be applied with a brush, sprayed or poured on, but the chain should be well flooded with lubricant and the boom should be extended and retracted to insure that the lubricant penetrates to the working surfaces. All excess lubricant should be wiped away from the external surfaces.

Note: Do not use solvents to remove excess lubricant.

C-4**Perform Axle Maintenance**

Note: Axle specifications require that this procedure be performed every 800 hours.

Differential lubricating oil - change

Required maintenance procedures and additional axle information is available in the *Dana Axle Maintenance and Repair Manual* (Dana part number MO213S20).

Dana Axle Maintenance and Repair Manual

Genie part number 57.4700.0008
(Genie Instructions Library)

Checklist D Procedures

D-1

Inspect the Forks

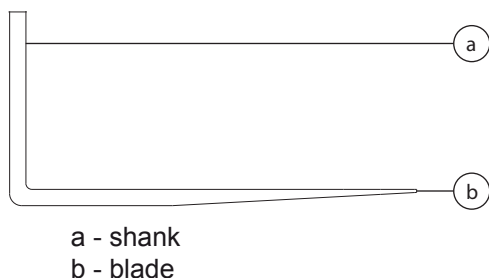


Genie specifications require that this procedure be performed every 1000 hours or annually, whichever comes first OR whenever permanent deformation of the forks is suspected.

Maintaining the lifting forks in good condition is essential to safe operation and good machine performance. Failure to detect damage to the forks could result in a hazardous operating condition.

- 1 Thoroughly clean the lifting forks.
- 2 Inspect the forks for the following:
 - Surface cracks
 - Straightness of the blade and shank
 - Fork angle at 90 ± 3 degrees
 - Relative height of fork tips shall not differ more than 3% of blade length
 - Excessive wear to the forks, fork mount or legible markings

Result: If any of the above criteria are not met, forks shall be removed from service until they are repaired or replaced.



D-2

Tighten the Boom Chains



Genie specifications require that this procedure be performed every 1000 hours or annually, whichever comes first.

To tighten the boom chains, follow the instructions below:

Extend chains (boom bottom side)

- 1 Raise the boom to horizontal position.
- 2 Fully extend the boom.
- 3 Retract it about 3.9 inches / 100 mm.
- 4 Tighten the chain up to a maximum tension value of 37 ft-lbs / 50 Nm.
- 5 Check that all chains have been equally tensioned. If not, repeat the operation described above.
- 6 Lock the chain tensioners by means of a counternut and locknut.

To achieve a proper tensioning of the four lower chains proceed as follows:

- 1 Tighten the first pair of chains to 30 Nm.
- 2 Tighten the second pair of chains to 30 Nm.
- 3 Alternately tighten the two pairs of chains to 5 Nm at a time until reaching the tension value of 50 Nm.

CHECKLIST D PROCEDURES

Retract chains (boom upper side)

- 1 Fully retract the boom.
- 2 Extend the boom by 11.8 inches / 300 mm.
- 3 Loosen the locker nut.
- 4 Tighten the tensioning nut to 37 ft-lbs / 50 Nm.
- 5 Tighten the locker nut.
- 6 Check that all chains have been equally tensioned. If not, repeat the operation described above.

Note: If during chain tensioning, problems are detected, please contact service.

D-3**Replace Hydraulic Tank Return Filter Element**

Genie specifications require that this procedure be performed every 1000 hours or annually, whichever comes first

Replacing the hydraulic return filter element is essential to good machine performance and service life. A dirty or clogged filter element may cause the machine to perform poorly and continued use may cause component damage. Extremely dirty conditions may require that the filter element be replaced more often.

⚠ CAUTION

Bodily injury hazard. Beware of hot oil. Contact with hot oil may cause severe burns.

Note: Perform this procedure with the engine off.

- 1 Remove the access cover to the tank.
- 2 Release the pressure in the oil reservoir by loosening the filler/breather cap.
- 3 Unscrew the return filter.
- 4 Install the new filter element.
- 5 Tighten the filler/breather cap.
- 6 Record the hours the filter element was replaced and keep with your maintenance records.
- 7 Start the engine.

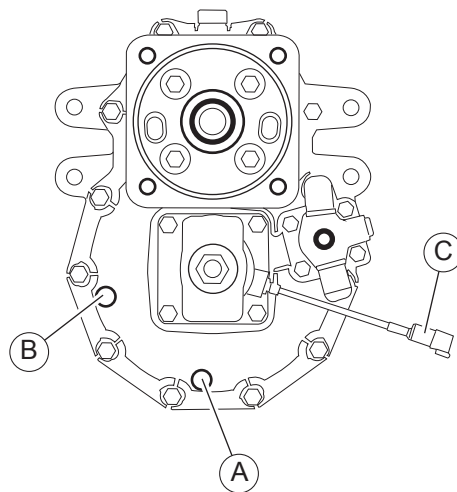
CHECKLIST D PROCEDURES

- 8 Inspect the filter assembly to be sure that there are no leaks.
- 9 Clean up any oil that may have spilled during the installation procedure.

D-4**Change Gearbox Oil**

Note: Transmission specifications require that this procedure be performed every 1000 hours.

- 1 Place a container of suitable size under drain plug (A).
- 2 Remove plug (B).
- 3 Remove drain plug (A) and empty the gearbox.
- 4 Refit and tighten drain plug (A).
- 5 Pour in new oil through filler (B) placed at the top of the reduction gear of the power divider. Stop when oil is level with hole (B).
- 6 Refit and tighten plug (B).
- 7 Clean the sensor (C) reading zone (every oil change).



CHECKLIST D PROCEDURES

D-5**Perform Engine Maintenance - All Models**

Note: Engine specifications require that this procedure be performed every 1000 hours.

Perkins 1204E-E44TA
Water pump - inspect

Deutz TCD 4.1 L4

Charge air cooler entry area - drain lube oil/condensate

V-belt, V-rib belt and tensioning pulley - check

Engine mounts - check

Fastening, hose unions / clips - check

Fuel filter cartridge - replace

Fuel pre-filter - replace

Suction air filter/dry air filter - check

Required maintenance procedures and additional engine information is available in the *Perkins 1204E-E44TA Operation and Maintenance Manual* (Perkins part number SEBU8605-01), *Deutz TCD 4.1 L4 Operation and Maintenance Manual* (Deutz part number 0312 4546).

Perkins 1204E-E44TA Operation and Maintenance Manual

Genie part number 57.4700.0009

Deutz TCD 4.1 L4 Operation and Maintenance Manual

Genie part number 57.4700.0004

D-6**Perform Engine Maintenance - Deutz Models**

Note: Engine specifications require that this procedure be performed annually.

Deutz TCD 4.1 L4

Fuel filter cartridge - replace

Fuel pre-filter - replace

Lubricating oil - replace

Lubricating oil filter/insert - replace

Required maintenance procedures and additional engine information is available in the *Deutz TCD 4.1 L4 Operation and Maintenance Manual* (Deutz part number 0312 4546).

Deutz TCD 4.1 L4 Operation and Maintenance Manual

Genie part number 57.4700.0004

CHECKLIST D PROCEDURES

D-7 Perform Axle Maintenance



Note: Axle specifications require that this procedure be performed every 1000 hours.

Planetary reduction lubricating oil - change Negative brake - adjust

Required maintenance procedures and additional axle information is available in the *Dana Axle Maintenance and Repair Manual* (Dana part number MO213S20).

Dana Axle Maintenance and Repair Manual

Genie part number	57.4700.0008
(Genie Instructions Library)	

D-8 Perform Engine Maintenance - Perkins Models



Note: Engine specifications require that this procedure be performed every 1500 hours.

Perkins 1204E-E44TA Engine crankcase breather element - replace

Required maintenance procedures and additional engine information is available in the *Perkins 1204E-E44TA Operation and Maintenance Manual* (Perkins part number SEBU8605-01),

Perkins 1204E-E44TA Operation and Maintenance Manual

Genie part number	57.4700.0009
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Checklist E Procedures

E-1

Test or Replace the Hydraulic Oil



Genie specifications require that this procedure be performed every 2000 hours or two years, whichever comes first

Replacement or testing of the hydraulic oil is essential for good machine performance and service life. Dirty oil may cause the machine to perform poorly and continued use may cause component damage. Extremely dirty conditions may require oil changes to be performed more frequently. Refer to Section 2, *Specifications*.

NOTICE

Component damage hazard. The work area and surfaces where this procedure will be performed must be clean and free of debris that could get into the hydraulic system.

Note: Before replacing the hydraulic oil, the oil may be tested by an oil distributor for specific levels of contamination to verify that changing the oil is necessary. If the hydraulic oil is not replaced at the two year inspection, test the oil quarterly. Replace the oil when it fails the test.

- 1 Lower the boom to the stowed position.
- 2 Remove the access cover to the tank.

- 3 Remove oil cap from top of hydraulic tank.
- 4 Using an approved hand-operated pump, drain the hydraulic tank into a suitable container. Refer to Section 2, *Specifications*.

CAUTION

Bodily injury hazard. Beware of hot oil. Contact with hot oil may cause severe burns.

- 5 Remove the drain plug.
- 6 Rinse out the inside of the tank using a mild solvent.
- 7 Install the drain plug and securely tighten. Do not over tighten.
- 8 Fill the tank with hydraulic oil until the fluid level is in the center of the sight glass at the front of the tank.
- 9 Clean up any oil that may have spilled.

CHECKLIST E PROCEDURES

E-2**Perform Engine Maintenance - All Models**

Note: Engine specifications require that this procedure be performed every 2000 hours.

Perkins 1204E-E44TA

Aftercooler core - inspect

Alternator - inspect

Engine mounts - inspect

Starting motor - inspect

Turbocharger - inspect

Deutz TCD 4.1 L4

Valve clearance - setting

V-belts - replace

Exhaust gas recirculation, rods clearance - check/adjust

Required maintenance procedures and additional engine information is available in the *Perkins 1204E-E44TA Operation and Maintenance Manual* (Perkins part number SEBU8605-01), *Deutz TCD 4.1 L4 Operation and Maintenance Manual* (Deutz part number 0312 4546).

Perkins 1204E-E44TA Operation and Maintenance Manual

Genie part number	57.4700.0009
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Deutz TCD 4.1 L4 Operation and Maintenance Manual

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E-3**Perform Engine Maintenance - Deutz Models**

Note: Engine specifications require that this procedure be performed every 2 years.

Deutz TCD 4.1 L4

V-belts - replace

Fuel pre-filter - replace

Coolant - replace

Required maintenance procedures and additional engine information is available in the *Deutz TCD 4.1 L4 Operation and Maintenance Manual* (Deutz part number 0312 4546).

Deutz TCD 4.1 L4 Operation and Maintenance Manual

Genie part number	57.4700.0004
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CHECKLIST E PROCEDURES

E-4**Perform Engine Maintenance -
Perkins Models**

Note: Engine specifications require that this procedure be performed every 3000 hours.

Perkins 1204E-E44TA**Alternator and fan belts - replace****Belt tensioner - inspect****Radiator pressure cap - clean/replace**

Required maintenance procedures and additional engine information is available in the *Perkins 1204E-E44TA Operation and Maintenance Manual* (Perkins part number SEBU8605-01),

**Perkins 1204E-E44TA Operation and Maintenance
Manual**

Genie part number	57.4700.0009
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E-5**Perform Engine Maintenance -
Perkins Models**

Note: Engine specifications require that this procedure be performed every 3000 hours or every two years, whichever comes first.

Perkins 1204E-E44TA**Cooling system coolant - change**

Required maintenance procedures and additional engine information is available in the *Perkins 1204E-E44TA Operation and Maintenance Manual* (Perkins part number SEBU8605-01),

**Perkins 1204E-E44TA Operation and Maintenance
Manual**

Genie part number	57.4700.0009
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CHECKLIST E PROCEDURES

E-6 Perform Engine Maintenance - Perkins Models



Note: Engine specifications require that this procedure be performed every 4000 hours.

Perkins 1204E-E44TA Aftercooler core - clean/test

Required maintenance procedures and additional engine information is available in the *Perkins 1204E-E44TA Operation and Maintenance Manual* (Perkins part number SEBU8605-01),

Perkins 1204E-E44TA Operation and Maintenance Manual

Genie part number	57.4700.0009
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E-7 Perform Engine Maintenance - Deutz Models



Note: Engine specifications require that this procedure be performed every 4500 hours.

Deutz TCD 4.1 L4 Flatter valve - replace V-rib belt and tensioning pulley - replace Spark plug of the DPF burner - replace

Required maintenance procedures and additional engine information is available in the *Deutz TCD 4.1 L4 Operation and Maintenance Manual* (Deutz part number 0312 4546).

Deutz TCD 4.1 L4 Operation and Maintenance Manual

Genie part number	57.4700.0004
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CHECKLIST E PROCEDURES

**E-8
Perform Engine Maintenance -
Deutz Models**

Note: Engine specifications require that this procedure be performed every 6000 hours.

**Deutz TCD 4.1 L4
Crankcase breather valve - replace
Intermediate engine overhaul**

Required maintenance procedures and additional engine information is available in the *Deutz TCD 4.1 L4 Operation and Maintenance Manual* (Deutz part number 0312 4546).

**Deutz TCD 4.1 L4 Operation and Maintenance
Manual**

Genie part number	57.4700.0004
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**E-9
Perform Engine Maintenance -
Deutz Models**

Note: Engine specifications require that this procedure be performed every 8000 hours.

**Deutz TCD 4.1 L4
General engine overhaul**

Required maintenance procedures and additional engine information is available in the *Deutz TCD 4.1 L4 Operation and Maintenance Manual* (Deutz part number 0312 4546).

**Deutz TCD 4.1 L4 Operation and Maintenance
Manual**

Genie part number	57.4700.0004
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CHECKLIST E PROCEDURES

E-10**Perform Engine Maintenance -
Perkins Models**

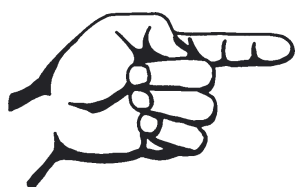
Note: Engine specifications require that this procedure be performed every 12000 hours.

**Perkins 1204E-E44TA
Cooling system coolant (extended life coolant)
- change**

Required maintenance procedures and additional engine information is available in the *Perkins 1204E-E44TA Operation and Maintenance Manual* (Perkins part number SEBU8605-01),

**Perkins 1204E-E44TA Operation and Maintenance
Manual**

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Repair Procedures



Observe and Obey:

- ☑ Repair procedures shall be completed by a person trained and qualified on the repair of this machine.
- ☑ Immediately tag and remove from service a damaged or malfunctioning machine.
- ☑ Repair any machine damage or malfunction before operating the machine.

Before Repairs Start:

- ☑ Read, understand and obey the safety rules and operating instructions in the appropriate operator's manual on your machine.
- ☑ Be sure that all necessary tools and parts are available and ready for use.
- ☑ Use only Genie approved replacement parts.
- ☑ Read each procedure completely and adhere to the instructions. Attempting shortcuts may produce hazardous conditions.
- ☑ Unless otherwise specified, perform each repair procedure with the machine in the following configuration:
 - Machine parked on a firm, level surface
 - Boom in the stowed position
 - Key switch in the off position with the key removed
 - Wheels chocked

About This Section

Most of the procedures in this section should only be performed by a trained service professional in a suitably equipped workshop. Select the appropriate repair procedure after troubleshooting the problem.

Perform disassembly procedures to the point where repairs can be completed. Then to re-assemble, perform the disassembly steps in reverse order.

Symbols Legend



Safety alert symbol—used to alert personnel to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, may cause minor or moderate injury.



Indicates a potentially hazardous situation which, if not avoided, may result in property damage.

Note: Used to indicate additional operation or procedure information.

⦿ Indicates that a specific result is expected after performing a series of steps.

✗ Indicates that an incorrect result has occurred after performing a series of steps.

Boom Components

1-1 Boom Proximity Switch

The boom angle switch is a proximity switch. This switch functions by sensing a change in its electromagnetic field when a metal object enters this field. A proximity switch is simply a metal detector.

The switch generates an electromagnetic field which is radiated out from the switch face. This field senses when the metal approaches the switch and when it moves away from it, which is how the switch contacts open and close.

This switch is of a fail-safe design. Should the switch or the switch wire circuit be faulty, the machine will not function outside its designed range of use.

The boom proximity switch is a component of the drive circuit and the chassis sway circuit. Both the drive and the chassis sway functions are disabled when the boom is raised to 50° or higher.

How to Test The Boom Proximity Switch

- 1 Remove the switch from the machine. Do not disconnect the switch wire harness from the machine.
 - 2 Start the engine.
 - 3 Move the switch away from any ferrous or metallic object.
- ⦿ Result: The light of the limit switch assembly is not illuminated.
- 4 Move the switch close to any ferrous or metallic object.
- ⦿ Result: The light of the proximity switch assembly turns on. The switch is functioning correctly.

BOOM COMPONENTS

How to Adjust The Boom Angle Proximity Switch

The boom angle proximity switch is attached to a mounting bracket, located between the boom and the chassis directly beneath the boom pivot pin. The switch location is adjustable.

- 1 Start the engine.
- 2 Raise the boom to 50°. Confirm with a digital level.
- 3 At the pivot end of the boom, locate the boom angle proximity switch. Loosen the fasteners securing the proximity switch assembly to the chassis, just enough to allow the bracket to move.
- 4 Move the proximity switch assembly until the light of the proximity switch turns on, then move the proximity switch assembly until the light of the proximity switch turns off.
- 5 Securely tighten the fasteners. Do not over tighten.
- 6 Lower the boom to 45°.
- ⦿ Result: The light of the proximity switch assembly is illuminated.
- 7 Raise the boom to 50°. Confirm with a digital level.
- ⦿ Result: The light of the proximity switch assembly is not illuminated. The proximity switch is properly calibrated.
- ✗ Result: The light of the proximity switch assembly is illuminated. The proximity switch is not calibrated correctly. Repeat the procedure beginning with step 4.

1-2 Boom

How to Replace the Boom Wear Pads

- 1 Extend the boom until the wear pads are accessible.
 - 2 **Fork end of the boom - lower wear pads:** Using a lifting strap from an overhead crane or a fork lift of sufficient capacity, lift the boom tube just enough to remove the weight from the pads.
 - 3 **Pivot end of the boom - lower and upper wear pads:** Use a prisebar to remove the weight of the boom inner section from the pads.
 - 4 Remove the wear pad retainer plates and remove the wear pads from the boom.
 - 5 Lubricate the wear surface of the new pads. Refer to Maintenance Procedure A-4, *Lubricate the Boom*.
- Note: Do not lubricate the side wear pads.
- 6 Install the wear pads. Install and securely tighten the retainer plates. Do not over tighten.

BOOM COMPONENTS

How to Remove the Lifting Fork Frame

- 1 With the boom in the stowed position, attach a lifting strap from an overhead crane to the top of the lifting fork frame at the front of the boom. Support the frame. Do not apply any lifting pressure.
- 2 If the machine is equipped with the lifting fork frame locking cylinder, disconnect the locking cylinder hoses from the boom.

⚠ WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

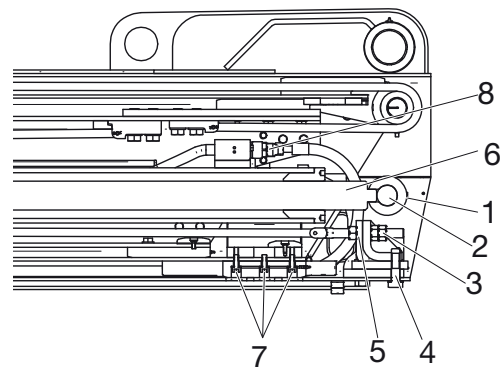
- 3 Remove the screw securing the fork level cylinder pivot pin to the lifting fork.
- 4 Use a soft metal drift to remove the pivot pin.
- 5 Remove the screw securing the fork frame pivot pin to the boom.
- 6 Use a soft metal drift to remove the pivot pin.
- 7 Using the overhead crane, lift and remove the fork frame from the boom.

⚠ CAUTION Crushing hazard. The fork frame could fall if not properly supported when the lock pin is removed from the machine.

How to Replace the Boom Retract Chains

Note: Perform this procedure on a firm, level surface with the wheels chocked.

- 1 Remove the boom, according to the dedicated paragraph.
- 2 Place the boom on a structure capable of supporting it.
- 3 Remove the screws "1" securing pin
- 4 Use a soft metal drift and a hammer to remove pin "2".
- 5 Remove the screws "3" securing chains to the boom.
- 6 Remove the screws "3" securing bracket "4".
- 7 Remove the bracket "4".
- 8 Disconnect the hydraulic hoses "8" from the cylinder overcenter valve, remove the six screws "7" securing the boom telescope cylinder to the second boom section.



BOOM COMPONENTS

- 9 Use an overhead crane to pull the boom telescope cylinder out of the second boom section by approximately 80 in / 2 m.
- 10 Remove the screws "f" securing the chain anchor plates "g" and remove the chains.
- 11 Remove the screws "a" securing the chain anchor plates "b" and remove the chains.
- 12 Securely attach a guide rope (length of about 395 inches / 10 m) to the chain. This will be used to install the new chain.

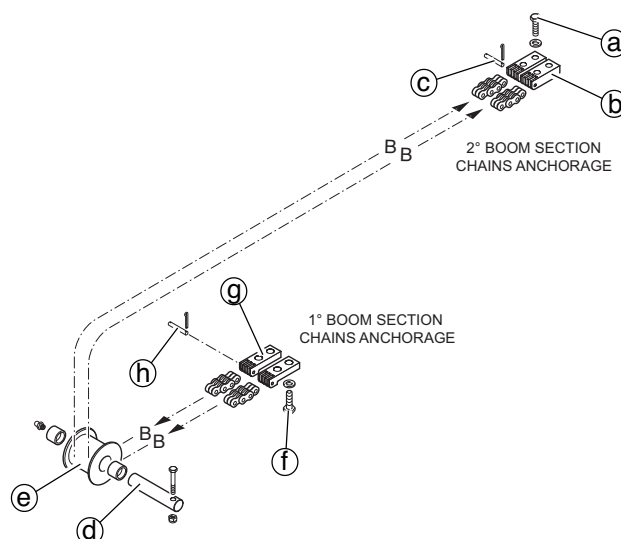
Note: The guide rope must be securely attached to the chain before removal. If the rope becomes disconnect from the chain during removal, the installation of the new chain will be difficult.

- 13 Remove the rope from the old chain and attach it to the new chain.
- 14 Using the assistance of a second operator, install the chain by pulling the guide rope from the fork end of the boom while the other operator guides the chain from the pivot end of the boom.

- 15 Remove the guide rope.
- 16 Install the screws "a" securing the chains.
- 17 Install the screws "f" securing the chains.
- 18 Reinstall the extension boom cylinder and secure it by screws "7"
- 19 Extend and retract the boom to insure it operates smoothly.

NOTICE

Component damage hazard. Chains can be damaged if the boom is used while the chains are out of adjustment. Do not return the machine to use until the chains have been correctly adjusted.

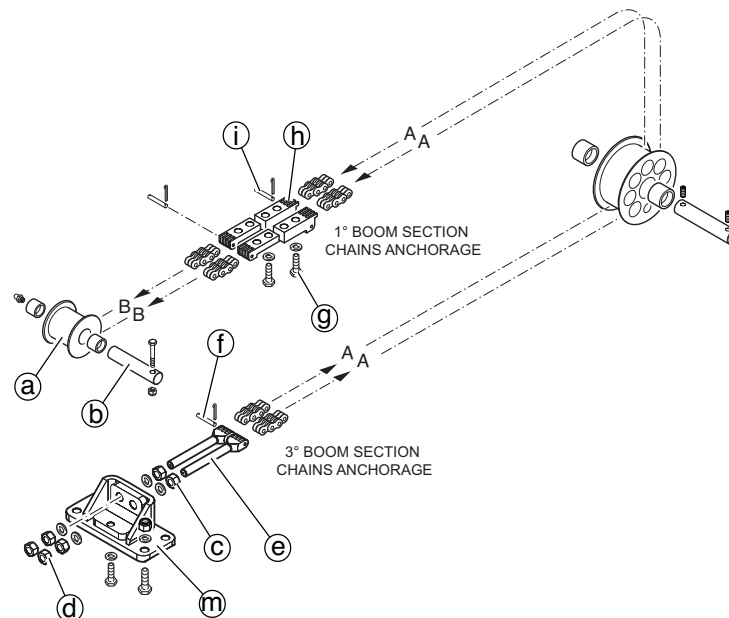


BOOM COMPONENTS

How to Replace the Boom Extend Chains

Note: Perform this procedure on a firm, level surface with the wheels chocked.

- 1 Remove the boom, according to the dedicated paragraph.
- 2 Place the boom on a structure capable of supporting it.
- 3 Remove pin "b" and pulley "a".
- 4 Remove the bracket "m".
- 5 Remove the boom telescope cylinder, according to the dedicated paragraph.
- 6 Remove nuts "c" and conternuts "d" to free the tensioners "e" placed inside the boom.
- 7 Remove the tensioners "e" from the chains, by pulling out the retaining fasteners "f".
- 8 Remove the screws "g" securing the chain anchor plates "h" of the retract chains,.
- 9 At the pivot end of the boom, remove the chain by pulling it out of the boom assembly.
- 10 Using the assistance of a second operator, install the chain by pulling the guide rope while the other operator guides the chain.
- 11 Remove the guide rope.
- 12 Connect the chains to the chain anchor plates "h" by means of the retaining fasteners "i".
- 13 Install the screws "g" securing the chains.
- 14 Connect the chains to the tensioners "e" by means of the retaining fasteners "f".
- 15 Install the tensioners "e" in the bracket "m", then install nuts "c" and conternuts "d" and tension the chains.
- 16 Install the pulley "a" and pin "b" previously removed from the pivot end of the boom.



BOOM COMPONENTS

- 17 Extend and retract the boom to insure it operates smoothly.

NOTICE

Component damage hazard. Chains can be damaged if the boom is used while the chains are out of adjustment. Do not return the machine to use until the chains have been correctly adjusted.

How to Remove the Boom

⚠ WARNING

Bodily injury hazard. This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools could result in death or serious injury and significant component damage. Dealer service is strongly recommended.

Note: When removing a hose assembly or fitting, the O-ring on the fitting and/or hose end must be replaced and then torqued to specification during installation. Refer to Section 2, *Hydraulic Hose and Fitting Torque Specifications*.

- 1 Remove the forks from the boom.
- 2 Disconnect the electric cables from the boom.
- 3 Lift the boom until the pin locking the lift cylinder is in a position above the cab roof.
- 4 Place a stand under the lift cylinder to properly support it once the pin connecting the cylinder to the boom will be removed.
- 5 Attach a lifting strap from an overhead crane to the fork support and slightly lift the boom. Do not apply any lifting pressure.
- 6 Attach a second strap from the overhead crane to the lifting cylinder, rod side, and put some tension on it.
- 7 Using a soft metal drift, remove the slave cylinder locking pin from the boom support.

⚠ DANGER

Crushing hazard. The cylinder will fall if not properly supported when the pivot pin is removed from the machine.

BOOM COMPONENTS

- 8 Using a soft metal drift, remove the lift cylinder locking pin, boom side.
- 9 Operate the 2 overhead cranes at the same time to lower the boom being careful to rest the lift cylinder onto the support previously placed underneath, and the boom tip onto another stand positioned to support the front part of the boom.
- 10 Hook the 4 lifting points and then slowly lift the boom.
- 11 Tag, disconnect and plug the hydraulic hoses that go to the extend, retract, fork tilt and fork leveling cylinders, and the quick coupling cylinder (if equipped).

⚠ WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 12 Using a soft metal drift, remove the pin securing the boom to the machine.

⚠ DANGER Crushing hazard. The boom will fall if not properly supported when the pivot pin is removed from the machine.

- 13 Carefully remove the boom assembly from the machine and place it on a structure capable of supporting it.

How to Disassemble the Boom

⚠ WARNING Bodily injury hazard. This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools could result in death or serious injury and significant component damage. Dealer service is strongly recommended.

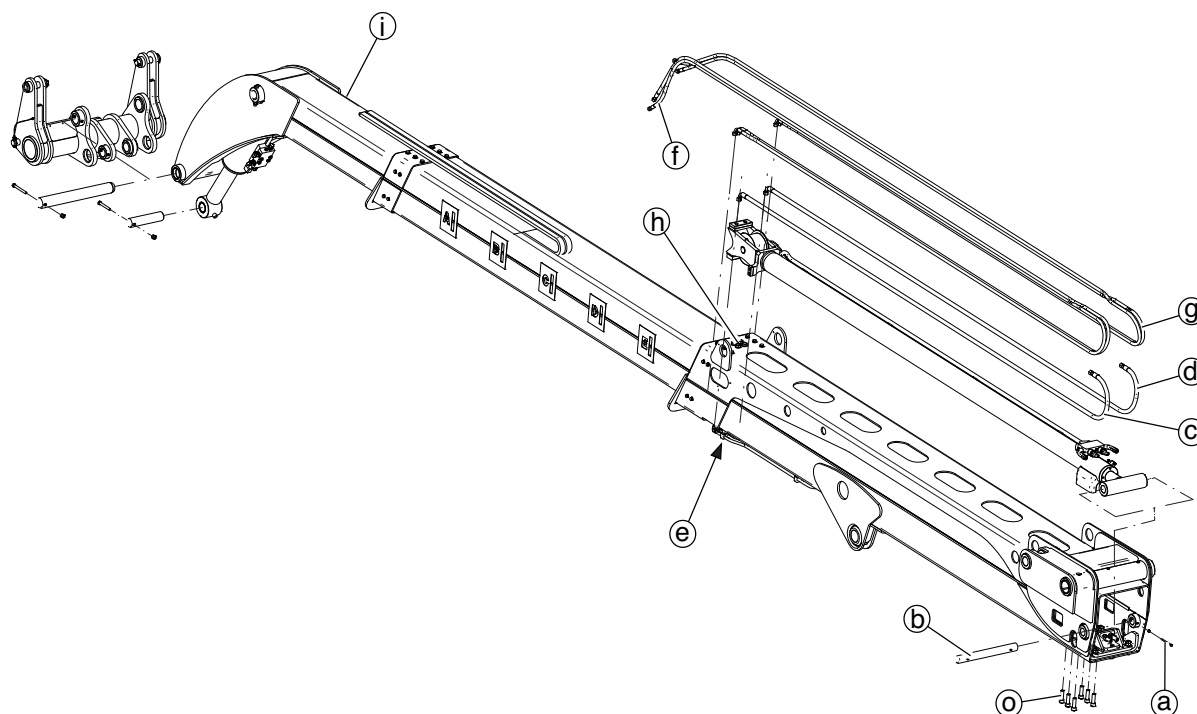
Note: When removing a hose assembly or fitting, the O-ring on the fitting and/or hose end must be replaced and then torqued to specification during installation. Refer to Section 2, *Hydraulic Hose and Fitting Torque Specifications*.

Note: Perform this procedure on a firm, level surface with the boom in the stowed position and the wheels chocked.

- 1 Raise the boom to a horizontal position.
- 2 Remove the screws “a” securing pin “b”.
- 3 Use a soft metal drift and a hammer to remove pin “b”.
- 4 Disconnect the flexible hoses “c” and “d” from the boom telescope cylinder, then cover the ends to prevent dirt from entering inside.
- 5 Reach position “e” under the boom.
- 6 Disconnect the flexible hoses “c” and “d”, then cover the ends to prevent dirt from entering inside. Pull them out from below the boom.
- 7 At the fork end of the boom, disconnect the flexible hoses from the fork tilt cylinder (ref. “f”) and the attachment lock/unlock cylinder (ref. “g”).

BOOM COMPONENTS

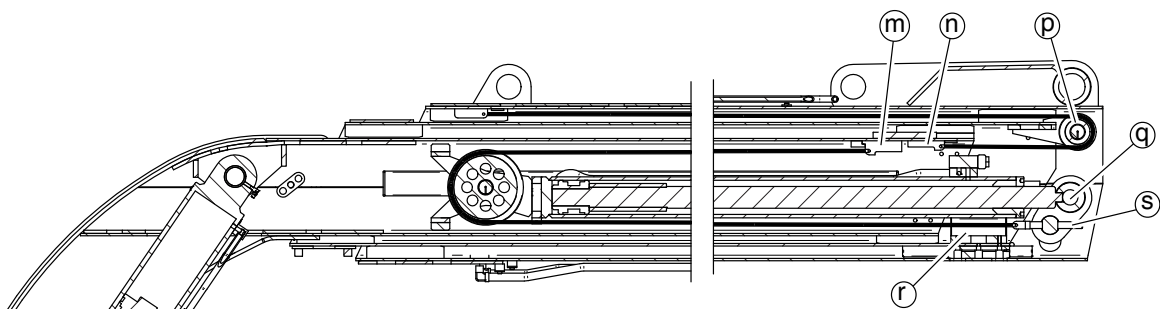
- 8 Cover the ends of the flexible hoses to prevent dirt from entering inside.
- 9 At the pivot end of the boom, remove the clamps and brackets securing the flexible hoses "f" and "g" to the boom section.
- 10 Securely attach a guide rope to the flexible hoses. This will be used to install the new hoses. Pull out the previously disconnected flexible hoses from the pivot end of the boom.
- 11 Reach position "e" under the boom.
- 12 Disconnect the flexible hoses "f" and "g", then cover the ends and pull them out completely.
- 13 At the pivot end of the boom, remove the locknuts of the extend chain tensioners.
- 14 Disassemble the support securing the extend chain tensioners and pull it out of the boom.
- 15 Reach the upper area of the boom fork end and remove the 4 screws "h" securing the boom retract chains, then pull out the end of the chain retaining the first boom section.
- 16 The second and third sections are disconnected from the first section and can be pulled out.
- 17 Using an overhead crane and lifting accessories compliant with the regulations in force, sling the boom in the position "i", slightly lift the boom in order to take the weight out from the lower pads, then pull the second and third sections out of approximately 16-19 in / 40-50 cm simultaneously.
- 18 Remove all front pads in the first boom section.
- 19 Attach lifting straps to the second and third boom sections; handle them very slowly, paying attention to the position of the straps to make sure the boom sections are always horizontal.



BOOM COMPONENTS

⚠ DANGER Ensure that the third section remains inside the second one and does not come out.

- 20 Once removed, place the second and third boom sections on two stands suitably positioned.
- 21 Remove the retaining screws from brackets "m" and "n" positioned at the pivot end of the boom, on top of it, and pull out the boom retract and extend chains.
- 22 Remove the 6 screws "o" securing the extend cylinder to the second boom section, and pull it out completely, by following the procedure described under "How to remove the extend cylinder".
- 23 At the fork end of the boom, attach lifting straps from an overhead crane to pull the third boom section out of the second by approximately 16-19 in / 40-50 cm.
- 24 Remove all the front pads in the second boom section.
- 25 Attach lifting straps to the third boom section. Pull the section out and handle very slowly, paying attention to the position of the straps to make sure the section is always horizontal.
- 26 Once removed, place the third section on two stands suitably positioned.
- 27 Remove the fork level cylinder by following the procedure described under "How to remove the fork level cylinder".
- 28 Remove the lifting fork frame by following the procedure described under "How to remove the lifting fork frame".
- 29 Remove all remaining pads from their housings.
- 30 Remove the pulley "p" mounted on top of the second boom section, at the back of it.



BOOM COMPONENTS

1-3 Boom Lift Cylinder

How to Remove the Lift Cylinder

Note: When removing a hose assembly or fitting, the O-ring on the fitting and/or hose end must be replaced and then torqued to specification during installation. Refer to Section 2, *Hydraulic Hose and Fitting Torque Specifications*.

- 1 Attach a lifting strap from an overhead 22045 lbs / 10,000 kg crane to the fork end of the boom. Support the boom. Do not apply any lifting pressure.
- 2 Tag, disconnect and plug the hydraulic hoses at the lift cylinder manifold. Cap the fittings.

⚠ WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

NOTICE Component damage hazard. Hoses can be damaged if they are kinked or pinched.

- 3 Attach a lifting strap from an overhead crane to the rod end of the lift cylinder. Support the cylinder. Do not apply any lifting pressure.
- 4 Remove the fasteners securing the lift cylinder barrel-end pivot pin to the chassis.
- 5 Use a soft metal drift to remove the pivot pin.

- 6 Remove the fasteners securing the lift cylinder rod-end pivot pin to the boom.

- 7 Use a soft metal drift to remove the pivot pin.

⚠ DANGER Crushing hazard. The boom will fall if not properly supported when the pivot pin is removed from the machine.

- 8 Using the overhead crane, raise the boom to a horizontal position. Remove the cylinder from the machine.

⚠ DANGER Crushing hazard. The cylinder could fall if not properly supported when removed from the machine.

BOOM COMPONENTS

1-4 Boom Extend Cylinder

How to Remove the Extend Cylinder

Note: When removing a hose assembly or fitting, the O-ring on the fitting and/or hose end must be replaced and then torqued to specification during installation. Refer to Section 2, *Hydraulic Hose and Fitting Torque Specifications*.

- 1 Raise the boom to a horizontal position.
- 2 Verify that the retaining screws "a" are visible and can be reached from the bottom of the boom, at the back of it. The third section features some holes matching the cylinder retaining screws, when the boom is retracted.
- 3 Tag, disconnect and plug the hydraulic hoses from the extend cylinder. Cap the cylinder fittings.

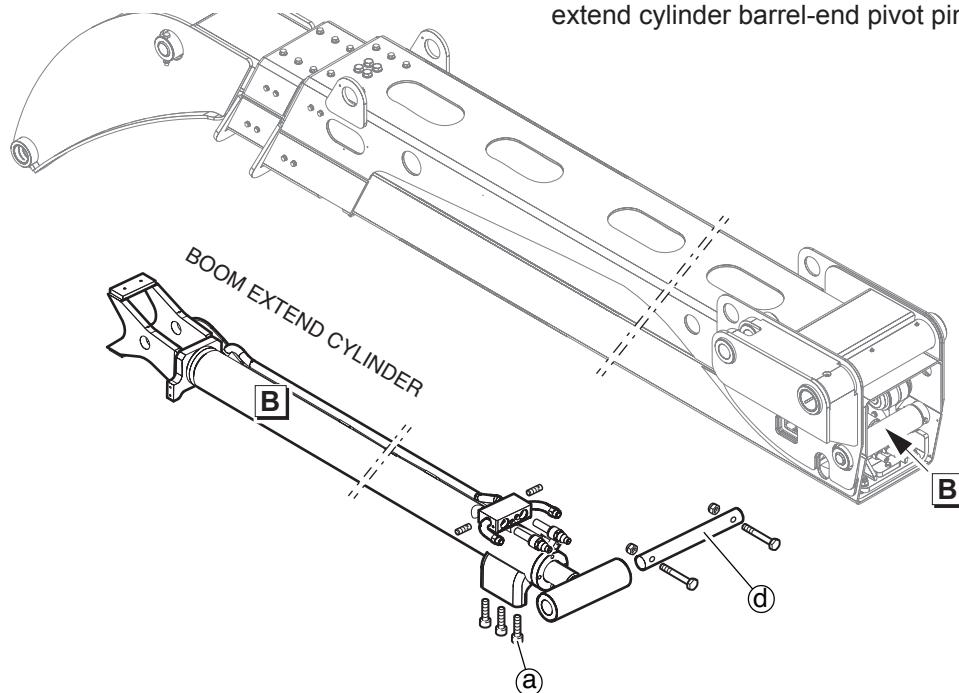
⚠ WARNING

Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

NOTICE

Component damage hazard. Hoses can be damaged if they are kinked or pinched.

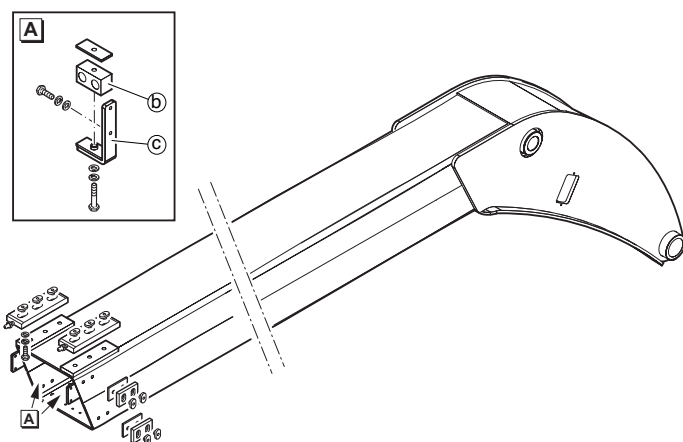
- 4 Open the fasteners "b" retaining the hoses inside the boom.
- 5 Remove the iron brackets "c".
- 6 Remove the cylinder screws, rod side.
- 7 Remove the retaining fasteners securing the extend cylinder barrel-end pivot pin.



BOOM COMPONENTS

- 8 Using a soft metal drift and a hammer, remove the pivot pin "d".
- 9 Remove the rear bracket the chain tensioners are secured to.
- 10 Partially pull the cylinder out. Using a lifting strap and an overhead crane, remove the cylinder.

⚠ DANGER Crushing hazard. The cylinder could fall if not properly supported when removed from the machine.



1-5 Fork Level Cylinder

How to Remove the Fork Level Cylinder

Note: When removing a hose assembly or fitting, the O-ring on the fitting and/or hose end must be replaced and then torqued to specification during installation. Refer to Section 2, *Hydraulic Hose and Fitting Torque Specifications*.

- 1 Remove the retaining fasteners securing the level cylinder rod end pivot pin.
- 2 Using a soft metal drift and a hammer, remove the pivot pin.
- 3 Using a lifting strap and an overhead crane, support the cylinder.
- 4 Place a container of suitable size under the hydraulic hoses before disconnecting.
- 5 Tag, disconnect and plug the hydraulic hoses from the level cylinder. Cap the cylinder fittings.

⚠ WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

NOTICE Component damage hazard. Hoses can be damaged if they are kinked or pinched.

BOOM COMPONENTS

- 6 Remove the retaining fasteners securing the level cylinder barrel end pivot pin.
- 7 Using a soft metal drift and a hammer, remove the pivot pin.
- 8 Carefully lift and remove the cylinder from the machine.

⚠ DANGER

Crushing hazard. The cylinder could fall if not properly supported when removed from the machine.

How to Replace the Fork Level Cylinder Hoses

Note: When removing a hose assembly or fitting, the O-ring on the fitting and/or hose end must be replaced and then torqued to specification during installation. Refer to Section 2, *Hydraulic Hose and Fitting Torque Specifications*.

- 1 Start the engine.
- 2 Raise the boom to a horizontal position.
- 3 Fully retract the boom.
- 4 Turn the machine off and remove the key from the key switch.
- 5 Before replacing a hydraulic hose, thoroughly clean the machine.
- 6 Tag, disconnect and plug the hydraulic hoses from the fork level cylinder.

⚠ WARNING

Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 7 Securely attach a guide rope (length about 395 inches / 10 m) to the hydraulic hoses. This will be used to install the new hoses.
- 8 At the pivot end of the boom, remove the lateral fasteners securing the hoses inside the first boom section, and pull the hoses out of the boom.
- 9 Get underneath the boom, disconnect the hoses from fittings "c", then pull out the hoses from underneath the boom.

BOOM COMPONENTS

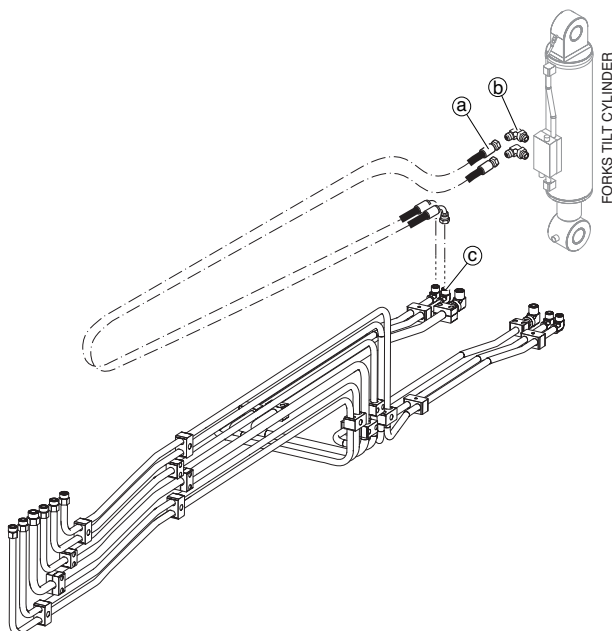
- 10 Remove the rope from the old hydraulic hoses and attach it to the new hydraulic hoses (straight end side).
- 11 Install the hoses "a" from underneath the boom: pull them from the rear side of the boom to connect the 90° ends to fittings "b".

- 12 Install the hoses "a" from behind the boom: pull them from the front side of the boom to connect the straight ends to fittings "b".

NOTICE Component damage hazard.
Hoses can be damaged if they are kinked or pinched.

- 13 Install the plastic fasteners securing the hoses to the rear side of the first boom section, at the back of the machine.

- 14 Start the engine, and extend and retract the boom. Verify that there are no abnormal tensions on the hoses.



1-6 Fork Tilt Cylinder

How to Remove the Fork Tilt Cylinder

Note: When removing a hose assembly or fitting, the O-ring on the fitting and/or hose end must be replaced and then torqued to specification during installation. Refer to Section 2, *Hydraulic Hose and Fitting Torque Specifications*.

- 1 Remove the forks from the frame.
- 2 Remove the retaining fasteners securing the fork tilt cylinder rod end pivot pin.
- 3 Using a soft metal drift and a hammer, remove the pivot pin.
- 4 Using a lifting strap and an overhead crane, support the cylinder.
- 5 Place a container of suitable size under the hydraulic hoses before disconnecting.
- 6 Tag, disconnect and plug the hydraulic hoses from the level cylinder. Cap the cylinder fittings.

⚠ WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

BOOM COMPONENTS

NOTICE

Component damage hazard.
Hoses can be damaged if they
are kinked or pinched.

- 7 Remove the retaining fasteners securing the
fork tilt cylinder barrel end pivot pin.
- 8 Using a soft metal drift and a hammer, remove
the pivot pin.
- 9 Carefully lift and remove the cylinder from the
machine.

⚠ DANGER

Crushing hazard. The cylinder
could fall if not properly
supported when removed from
the machine.

Operator's Compartment

2-1 Operator's Compartment

How to Remove the Operator's Compartment

The operator's compartment is used to activate machine functions while sitting in the operator's drivers seat.

Within the operator's compartment there is a transmission column shifter, steering selector, 4-way controller, accelerator pedal, brake pedal and a differential lock switch. All of these components are replaceable.

For further information or assistance, consult the Genie Service Department.

⚠ WARNING Bodily injury hazard. This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools could result in death or serious injury and significant component damage. Dealer service is required.

- 1 Start the diesel engine and raise the boom above the cab.
- 2 Get behind the front right wheel and disconnect the battery from the machine.

⚠ WARNING Electrocution/burn hazard. Contact with electrically charged circuits could result in death or serious injury. Remove all rings, watches and other jewelry.

- 3 Remove the protective cover next to the cab - inner side of the machine.
- 4 Cut the plastic fasteners fixing the electrical cables, then disconnect all of the electrical wires.
- 5 Remove the guards under the steering wheel to access the pipes of the power steering.
- 6 Tag, disconnect and plug the hydraulic lines of the power steering unit and of the heater.

⚠ WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 7 Remove the cover which is located under the cab.
- 8 Disconnect the electrical and hydraulic connections from the brake pump.

⚠ WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 9 Disconnect the ground wire. Remove the joystick guard inside the cab; remember to disconnect the electric plugs.

OPERATOR'S COMPARTMENT

- 10 Remove the 4 retaining fasteners of the cabin.
- 11 Install and secure two eyebolts to the top the cabin in the special seats.
- 12 Using a sling chain and an overhead crane, slowly raise the cabin away from the machine and set it on a supporting device.

NOTICE Component damage hazard. Wrapping a strap around the cab and lifting using an overhead crane can put excessive pressure on the glass windows of the cab, causing the windows to break. Do not lift the cab using a strap from an overhead crane.

Bolt torque specification

Operator's cab mounting bolts	155 ft-lbs
	210 Nm
	(plus Locktite compound)

OPERATOR'S COMPARTMENT

2-2 Machine Controls

How to Remove the Steering Column

- 1 Get behind the front right wheel and disconnect the battery from the machine.

⚠ WARNING Electrocution/burn hazard. Contact with electrically charged circuits could result in death or serious injury. Remove all rings, watches and other jewelry.

- 2 Remove the lower part of the dashboard.
- 3 Remove the upper part of the dashboard.
- 4 Remove the transmission control lever.
- 5 Remove the light control lever.
- 6 Remove the screws which secure the steering column to the frame.
- 7 Remove the steering column.

How to Remove the Steering Wheel

- 1 Get behind the front right wheel and disconnect the battery from the machine.

⚠ WARNING Electrocution/burn hazard. Contact with electrically charged circuits could result in death or serious injury. Remove all rings, watches and other jewelry.

- 2 Remove the horn button from the steering wheel. Remove the nut securing the steering wheel to the column and remove the steering wheel.

OPERATOR'S COMPARTMENT

How to Remove the Steer Rotation Actuator

- 1 Remove the steering column. See 2-2, *How to Remove the Steering Column*.
- 2 Working under the dashboard, locate the hydraulic hoses of the steer rotation actuator.
- 3 Tag, disconnect and cap the hydraulic hoses and steer rotation actuator holes.

⚠ WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 4 Remove the retaining fasteners that secure the steer rotation actuator to the frame.
- 5 Remove the steer rotation actuator.

How to Remove the Joystick

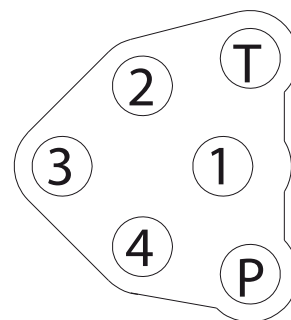
- 1 Get behind the front right wheel and disconnect the battery from the machine.

⚠ WARNING Electrocution/burn hazard. Contact with electrically charged circuits could result in death or serious injury. Remove all rings, watches and other jewelry.

- 2 Remove the retaining fasteners that secure the joystick to the mount panel.
- 3 Tag and disconnect the joystick harness connector from the machine.
- 4 Tag, disconnect and plug the hoses from ports 1, 2, 3, 4, P and T of the joystick. Cap the fittings.

Note: Removing the hydraulic hose from port T of the joystick with the joystick below the hydraulic oil level in the hydraulic tank will result in excessive hydraulic fluid leaking from the hose. Do not disconnect the hose from the port if the joystick is below the hydraulic oil level in the hydraulic tank.

- 5 Remove the fasteners securing the joystick to the mount panel. Remove the joystick.



Joystick port orientation

OPERATOR'S COMPARTMENT

How to Remove the Brake Pedal Assembly

- 1 Set the ignition switch to position "1".
- 2 Fully depress then release the brake pedal until the low brake pressure warning light comes on.
- 3 Go on depressing and releasing the brake pedal for about one minute in order to relieve all the pressure in the system.
- 4 Set the ignition switch to position "0".
- 5 Get behind the front right wheel and disconnect the battery from the machine.

⚠ WARNING Electrocution/burn hazard. Contact with electrically charged circuits could result in death or serious injury. Remove all rings, watches and other jewelry.

- 6 Tag and disconnect the brake harness.
- 7 Tag, disconnect and plug the hydraulic hoses of the brake pedal pump.

⚠ WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 8 Remove the retaining fasteners securing the brake pedal. Remove the brake pedal.

How to Remove the Gauge Cluster Assembly

- 1 Get behind the front right wheel and disconnect the battery from the machine.

⚠ WARNING Electrocution/burn hazard. Contact with electrically charged circuits could result in death or serious injury. Remove all rings, watches and other jewelry.

- 2 Remove the upper part of the dashboard.
- 3 Reach under the dashboard and gently push the gauge cluster through the opening in the dashboard.
- 4 Tag and disconnect the wire harness from the gauge cluster. Remove the gauge cluster from the machine.

Fuel and Hydraulic Tank

3-1

Fuel and Hydraulic Tank

How to Remove the Fuel and Hydraulic Tank

⚠ DANGER Explosion and fire hazard. Engine fuels are combustible. Remove the fuel tank in an open, wellventilated area away from heaters, sparks, flames and lighted tobacco. Always have an approved fire extinguisher within easy reach.

⚠ DANGER Explosion and fire hazard. Never drain or store fuel in an open container due to the possibility of fire.

⚠ DANGER Explosion and fire hazard. When transferring fuel, connect a grounding wire between the machine and pump or container.

⚠ WARNING Bodily injury hazard. This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools could result in death or serious injury and significant component damage. Dealer service is strongly recommended.

- 1 Get behind the front right wheel and disconnect the battery from the machine.

⚠ WARNING Electrocution/burn hazard. Contact with electrically charged circuits could result in death or serious injury. Remove all rings, watches and other jewelry.

HYDRAULIC TANK

- 2 Close the oil intake valve.
- 3 Remove the access cover to the tank.
- 4 Remove the filler cap from the hydraulic tank.
- 5 Place a drain pan or other suitable container under the hydraulic tank. Refer to Section 2, *Specifications*.
- 6 Remove the drain plug from the hydraulic tank and completely drain the tank.

⚠ CAUTION Bodily injury hazard. Beware of hot oil. Contact with hot oil may cause severe burns.

- 7 Proceed to step 11.

FUEL TANK

- 8 Tag and disconnect the wire harness from the fuel level terminals.
- 9 Tag, disconnect and plug the fuel hoses.
- 10 Remove the filler cap from the fuel tank.

FUEL AND HYDRAULIC TANK

- 11 Using an approved hand-operated pump, drain the fuel tank into a container of suitable capacity. Refer to Section 2, Specifications.

⚠ WARNING Explosion and fire hazard. When transferring fuel, connect a grounding wire between the machine and pump or container.

Note: Be sure to only use a hand operated pump suitable for use with gasoline and/or diesel fuel.

- 12 Remove all the screws.
- 13 Loosen all the clamps and pull out the hoses.
- 14 Disconnect the electrical harnesses.
- 15 Remove the wire harness from bulb on the hydraulic filter.
- 16 Place a container of suitable size under the hydraulic hoses before disconnecting.

NOTICE Used oils must be handled and disposed of according to local regulations.

- 17 Disconnect all hydraulic hoses.
- 18 Remove the retaining fasteners securing the tanks to the machine.
- 19 Using a lifting strap and an overhead crane, remove the tanks from the machine.

⚠ WARNING Crushing hazard. The tanks could become unbalanced and fall if not properly supported when removed from the machine.

Engines

4-1 Engines

How to Repair the Perkins 1204E-E44TA Engine

Repair procedures and additional engine information is available in the *Perkins 1204E-E44TA Operation and Maintenance Manual* (Perkins part number SEBU8605-01), and the *Perkins 1204E-E44TA Service Manual* (Perkins part number KENR9125-01) and the *Perkins 1204E-E44TA Troubleshooting Manual* (Perkins part number KENR9116-01).

Perkins 1204E-E44TA Operation and Maintenance Manual

Genie part number	57.4700.0009
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Perkins 1204E-E44TA Service Manual

Genie part number	57.4700.0012
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Perkins 1204E-E44TA Troubleshooting Manual

Genie part number	57.4700.0014
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How to Repair the Deutz TCD 4.1 L4 Engine

Repair procedures and additional engine information is available in the *Deutz TCD 4.1 L4 Workshop Manual*

4-2 Engine Fault Codes

How to Retrieve Engine Fault Codes

When the engine Electronic Control Module (ECM) detects an abnormal operating condition, a fault code is immediately stored in the ECM memory. At the same time, a colored warning lamp is illuminated and the fault code is shown on the engine diagnostic display, located on the dashboard in the operator's compartment.

To learn the specifications of and how to use the fault codes, refer to Section 5, *Fault Codes*.

Transmission

5-1 Gear Box

How to Repair the Gear Box

Repair procedures and additional gear box information is available in the *Dana Integral Gear Box Shift in Fly Maintenance and Repair Manual* (Dana part number MO367110).

Dana Integral Gear Box Shift on Fly Maintenance and Repair Manual

Genie part number 57.4700.0007

5-2 Axle

How to Remove the Axle

⚠ WARNING Bodily injury hazard. This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools could result in death or serious injury and significant component damage. Dealer service is required.

- 1 Chock the wheels.
- 2 Remove the fasteners securing the driveshaft to the transmission. Lower the end of the driveshaft to the ground.
- 3 Remove the fasteners securing the driveshaft to the axle. Remove the driveshaft from the machine.
- 4 Tag and remove the hydraulic hoses from the axle.

⚠ WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 5 Loosen the lug nuts of both wheels on the axle to be removed. Do not remove the lug nuts.

TRANSMISSION

- 6 Raise the end of the machine until the tires are off the ground. Place blocks under the chassis for support.

⚠ WARNING Crushing hazard. The chassis will fall if not properly supported.

- 7 Remove the lug nuts. Remove the tire and wheel assembly from both ends of the axle.
- 8 Support and secure the axle to an appropriate lifting device.
- 9 Remove the fasteners securing the sway cylinder rod-end pivot pin to the chassis.
- 10 Use a soft metal drift to remove the pivot pin.
- 11 Remove the fasteners securing the axle to the chassis. Remove the axle from the machine.

⚠ WARNING Crushing hazard. The axle will fall if not properly supported when the fasteners are removed from the machine.

Bolt torque specification

Axle mounting bolts	515 ft-lbs
	700 Nm

Hydraulic Pumps

6-1 Boom and Steering Function Pump

How to Test the Boom and Steering Function Pump

- 1 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to port TP1.
 - 2 Start the engine.
 - 3 Increase the engine speed to maximum rpm.
 - 4 Activate and hold boom retract.
 - 5 Without releasing the joystick, keep pushing the throttle pedal.
- ⦿ Result: the pressure gauge reads 3770 psi / 260 bar. The pump is good.
- ✗ Pressure is not within specification.
The pump needs to be adjusted OR the pump or pump coupling is faulty and needs to be serviced or replaced.

NOTICE Component damage hazard.
There is no relief valve in the hydraulic pump and the pump can be damaged if the pressure is allowed to exceed specification. When testing the pump, crank the engine in one second intervals until the correct pressure is confirmed. Do not over-pressurize the pump.

- 6 Remove the pressure gauge and install plug onto port TP1.

HYDRAULIC PUMPS

How to Remove the Boom and Steering Function Pump

⚠ WARNING Bodily injury hazard. This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools could result in death or serious injury and significant component damage. Dealer service is strongly recommended.

Note: When removing a hose assembly or fitting, the fitting and/or hose end must be torqued to specification during installation. Refer to Section 2, *Hydraulic Hose and Fitting Torque Specifications*.

Note: Perform this procedure with the engine off and cool to the touch.

- 1 Get behind the front right wheel and disconnect the battery from the machine.

⚠ WARNING Electrocuting/burn hazard. Contact with electrically charged circuits could result in death or serious injury. Remove all rings, watches and other jewelry.

- 2 Close the hydraulic tank ball valve.

- 3 Remove the engine cover to easily reach the pumps.

- 4 Tag, disconnect and plug the case drain hose located at the top of the pump. Cap the fitting on the pump.

⚠ WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

Note: Placing the open end of the case drain hose below the hydraulic oil level in the hydraulic tank will result in excessive hydraulic fluid leaking from the hose. Do not lower the open end of the case drain hose below the fluid level of the hydraulic tank until the hose is plugged.

- 5 Tag, disconnect and plug the hydraulic pump supply hose at the pump. Cap the fitting on the pump.

Note: Placing the open end of the case drain hose below the hydraulic oil level in the hydraulic tank will result in excessive hydraulic fluid leaking from the hose. Do not lower the open end of the case drain hose below the fluid level of the hydraulic tank until the hose is plugged.

- 6 Tag, disconnect and plug the high pressure hose at the pump. Cap the fitting on the pump.

- 7 Remove the fasteners securing the pump, then remove the pump from the machine.

⚠ WARNING Crushing hazard. The pump will fall if not properly supported when the fasteners are removed from the machine.

HYDRAULIC PUMPS

How to Install the Boom and Steering Function Pump

⚠ WARNING Bodily injury hazard. This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools could result in death or serious injury and significant component damage. Dealer service is strongly recommended.

Note: When removing a hose assembly or fitting, the fitting and/or hose end must be torqued to specification during installation. Refer to Section 2, *Hydraulic Hose and Fitting Torque Specifications*.

Note: Perform this procedure with the engine off and cool to the touch.

- 1 Install the boom function pump on the transmission pump.
- 2 Install the high pressure hose onto the pump outlet.

⚠ WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 3 Install the low pressure hose onto the pump outlet. Install the hose retaining rings and fasteners.
- 4 At the case drain at the top of the pump, fill the pump with hydraulic fluid until it reaches the top of the case drain fitting.

- 5 Install the case drain hose onto the pump.
- 6 Securely install the wire harness onto the pump.
- 7 Open the hydraulic tank ball valve.
- 8 Check the hydraulic fluid level in the hydraulic tank. Add fluid if needed.
- 9 Start the engine and prime the pump. See 6-1, *How to Prime the Boom and Steering Function Pump*.
- 10 Inspect for leaks.
- 11 Adjust the pump pressure. See 6-1, *How to test the Boom and Steering Function Pump*.

HYDRAULIC PUMPS

How to Prime the Boom and Steering Function Pump

- 1 Connect a 0 to 870 psi / 0 to 60 bar pressure gauge to port TP5.
- 2 Open the hydraulic tank ball valve.
- 3 Start the engine, allow the engine to run at low idle for 5 seconds and then shut off the engine. Wait 15 seconds, then start the engine again. Allow the engine to run at low idle for 10 seconds and then shut off the engine.
- 4 Start and shut off the engine again; do not accelerate and wait for the pressure gauge to read a pressure of approx. 290 psi / 20 bar. When the value becomes stable, the pump is filled.
- 5 With the engine running, move the joystick slowly to verify that the movements are performed correctly.
- 6 Shut off the engine and inspect for oil leaks.

How to Adjust the Boom and Steering Function Pump Standby Pressure

- 1 Connect a 0 to 1450 psi / 0 to 100 bar pressure gauge to port TP1 (pump stand-by pressure test port).
- 2 Start the engine and allow the engine to run at low idle.
 - ⦿ Result: the pressure gauge reads 290 psi / 20 bar. The pump is good. Proceed to step 5.
 - ✗ Pressure is not within specification. The pressure setting needs to be adjusted. Proceed to step 3.
- 3 Loosen the set screw for the standby pressure adjustment screw.
- 4 Adjust the function pump standby pressure. Turn the adjustment screw clockwise to increase the pressure or counterclockwise to decrease the pressure. Tighten the set screw.
- 5 Turn the engine off and remove the pressure gauge.

HYDRAULIC PUMPS

How to Adjust the Boom and Steering Function Pump Pressure Compensator

Note: Two people will be required to perform this procedure.

- 1 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to port TP1.
- 2 Start the engine and allow the engine to run at low idle.
- 3 Fully retract the boom.
- 4 Continue to activate the boom retract function and observe the pressure reading on the pressure gauge.
- 5 Turn the pressure relief valve on the function manifold incrementally and ensure that the pressure gauge reading begins to increase.
- 6 Stop turning the valve on the function manifold when the pressure gauge reading is stable.
- ⦿ Result: the pressure gauge reads 3915 psi / 270 bar. The pump is good. Proceed to step 9.
- ✗ Pressure is not within specification. The pressure setting needs to be adjusted. Proceed to step 7.
- 7 Loosen the set screw for the pressure compensator adjustment screw.
- 8 Adjust the pressure compensator pressure. Turn the adjustment screw clockwise to increase the pressure; turn the adjustment screw counterclockwise to decrease the pressure. Tighten the set screw.

⚠ WARNING Component damage hazard. Do not adjust the pressure compensator higher than specified.

- 9 Turn the pressure relief valve on the function manifold again until the pressure gauge reads 2770 psi / 260 bar.
- 10 Turn the engine off and remove the pressure gauge.

HYDRAULIC PUMPS

6-2 Auxiliary Gear Pump

How to Test the Auxiliary Gear Pump

- 1 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to port TP2.
 - 2 Start the engine.
 - 3 Increase the engine speed to maximum rpm.
 - 4 Bring the attachment lock cylinder to the end stop.
- ⦿ Result: the pressure gauge reads 3335 psi / 230 bar. The pump is good.
- ✗ Pressure is not within specification.
Adjust the auxiliary system relief valve on the chassis sway and boom auxiliary manifold.

How to Remove the Auxiliary Gear Pump

⚠ WARNING Bodily injury hazard. This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools could result in death or serious injury and significant component damage. Dealer service is strongly recommended.

Note: When removing a hose assembly or fitting, the fitting and/or hose end must be torqued to specification during installation. Refer to Section 2, *Hydraulic Hose and Fitting Torque Specifications*.

Note: Perform this procedure with the engine off and cool to the touch.

- 1 Close the hydraulic tank ball valve.
- 2 Tag, disconnect and plug the hydraulic hoses. Cap the fittings.

⚠ WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 3 Cap the auxiliary gear pump holes and the hoses ones.
- 4 Remove the auxiliary gear pump.

HYDRAULIC PUMPS

How to Install the Auxiliary Gear Pump

⚠ WARNING Bodily injury hazard. This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools could result in death or serious injury and significant component damage. Dealer service is strongly recommended.

Note: When removing a hose assembly or fitting, the fitting and/or hose end must be torqued to specification during installation. Refer to Section 2, *Hydraulic Hose and Fitting Torque Specifications*.

Note: Perform this procedure with the engine off and cool to the touch.

1 Install the auxiliary gear pump to the engine.

2 Connect the hydraulic hoses to the pump.

⚠ WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

3 Open the hydraulic tank ball valve.

4 Start the engine and prime the pump. See 6-2, *How to Prime the Auxiliary Gear Pump*.

5 Inspect for leaks.

6 Adjust the pump pressure. See 6-2, *How to test the Auxiliary Gear Pump*.

HYDRAULIC PUMPS

How to Prime the Auxiliary Gear Pump

- 1 Start the engine, allow the engine to run at low idle for 15 seconds then shut off the engine.
- 2 Wait 15 seconds, then start the engine again.
- 3 Allow the engine to run at low idle for 15 seconds and then shut off the engine.

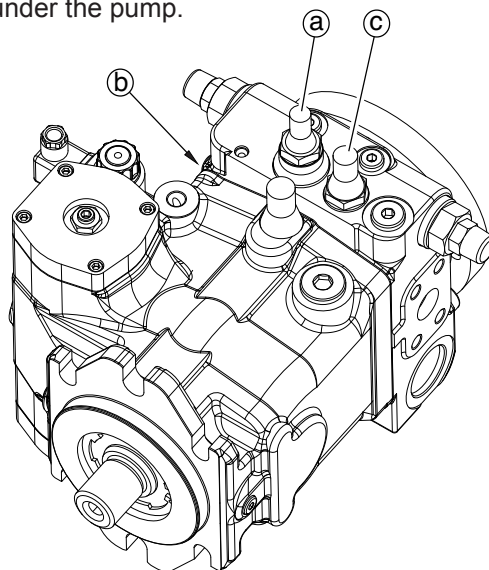
HYDRAULIC PUMPS

6-3 Hydrostatic Transmission Pump

How to Test the Hydrostatic Transmission Pump

Note: Perform this procedure on a firm, level surface, with the boom in the stowed position and brake pedal engaged.

- 1 In the proximity of the drive pump, spot the valve deactivating the drive pump inching. Once the test is completed, open the valve.
- 2 Connect a 0 to 8700 psi / 0 to 600 bar pressure gauge to port TP4 (hydrostatic transmission high pressure test port).
- 3 Connect a 0 to 870 psi / 0 to 60 bar pressure gauge to port TP3 (hydrostatic transmission boost pressure test port).
- 4 Start the engine. Shift the transmission into second gear.
 - ⊙ Result: the pressure gauge connected to test port TP3 reads 406 psi / 28 bar.
 - ✖ Pressure is not within specification. Adjust the boost pressure valve "c" located under the pump.
- 5 Increase the engine speed to 1100 rpm.
- 6 Release parking brake.
- 7 Engage forward gear.
 - ⊙ Result: the pressure gauge connected to test port TP4 reads 725 psi / 50 bar.
 - ✖ Pressure is not within specification. Adjust the DA valve "a" located under the pump.
- 8 Increase the engine speed to maximum rpm.
 - ⊙ Result: the pressure gauge on test port TP4 reads 6450 psi / 450 bar.
 - ✖ Pressure is not within specification. Adjust the high pressure relief valve "b" located on the side of the pump.
- 9 While observing the pressure gauge connected to test port TP3, operate the engine between 1100 rpm and maximum rpm.
 - ⊙ Result: the pressure gauge on test port TP3 does not go below 406 psi / 28 bar.
 - ✖ Pressure is not within specification. Adjust the boost pressure valve "c" located under the pump.



HYDRAULIC PUMPS

How to Remove the Hydrostatic Transmission Pump

⚠ WARNING Bodily injury hazard. This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools could result in death or serious injury and significant component damage. Dealer service is strongly recommended.

Note: When removing a hose assembly or fitting, the fitting and/or hose end must be torqued to specification during installation. Refer to Section 2, *Hydraulic Hose and Fitting Torque Specifications*.

Note: Perform this procedure with the engine off and cool to the touch.

- 1 Open the engine compartment.
- 2 Remove the front cover of the engine housing.
- 3 Remove the cover that is under engine.
- 4 Locate the battery disconnect switch and disconnect the battery from the machine.
- 5 Remove the retaining fasteners that secure the battery disconnect switch mounting plate.

- 6 Tag, disconnect and plug the hoses that are connected to the hydrostatic transmission pump. Cap the fittings.

⚠ WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 7 Remove the auxiliary gear pump from the hydrostatic transmission pump.
- 8 Tag and disconnect the harness from the transmission.
- 9 Support and secure the transmission pump to a suitable lifting device. Do not apply lighting pressure.

- 10 Remove the hydrostatic transmission pump.

⚠ WARNING Crushing hazard. The hydrostatic transmission pump will fall if not properly supported when the fasteners are removed from the machine.

HYDRAULIC PUMPS

How to Install the Hydrostatic Transmission Pump

⚠ WARNING Bodily injury hazard. This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools could result in death or serious injury and significant component damage. Dealer service is strongly recommended.

Note: When removing a hose assembly or fitting, the fitting and/or hose end must be torqued to specification during installation. Refer to Section 2, *Hydraulic Hose and Fitting Torque Specifications*.

Note: Perform this procedure with the engine off and cool to the touch.

- 1 Open the engine compartment.
 - 2 Remove the front cover of the engine housing.
 - 3 Remove the cover that is under engine.
 - 4 Attach a lifting strap and lift the transmission pump using a overhead crane.
 - 5 Install the hydrostatic transmission pump on the engine.
 - 6 Remove the fitting caps from the hydrostatic transmission pump.
 - 7 Remove the hoses caps.
 - 8 Connect the hoses to the pump.
- ⚠ WARNING** Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.
- 9 Connect the harness to the transmission pump.
 - 10 Install the auxiliary gear pump on the hydrostatic transmission pump.
 - 11 Install the retaining fasteners securing the battery disconnect switch mounting plate.
 - 12 Start the engine and prime the pump. See 6-3, *How to Prime the Hydrostatic Transmission Pump*.
 - 13 Inspect for leaks.
 - 14 Adjust the pump pressure. See 6-3, *How to test the Hydrostatic Transmission Pump*.

HYDRAULIC PUMPS

How to Prime the Hydrostatic Transmission Pump

⚠ WARNING Bodily injury hazard. This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools could result in death or serious injury and significant component damage. Dealer service is strongly recommended.

- 1 Connect a 0 to 870 psi / 0 to 60 bar pressure gauge to port TP3 (hydrostatic transmission boost pressure test port).
- 2 Start the engine. Run at low idle for 5 seconds. Shut the engine off and wait for 15 seconds.
- 3 Start the engine. Run at low idle for 10 seconds. Shut the engine off and wait for 15 seconds.
- 4 Note: Repeat step 4 until the pressure gauge connected to TP3 reads 290 psi / 20 bar or greater.
- 5 Apply the brake pedal and start the engine. Shift the transmission into forward and disengage the emergency brake.
- 6 Release the brake pedal and slowly increase the engine rpm until the machine starts to move. Apply the brake.
- 7 Shift the transmission into reverse. Release the brake pedal and slowly increase the engine rpm until the machine starts to move. Apply the brake.
- 8 Engage the emergency brake and turn the engine off. Check for hydraulic leaks.

Manifolds

7-1 Function Manifold

How to Set the Steer Pressure

- 1 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to port TP1 on the function manifold (boom and steering functions hydraulic test port).
- 2 Start the engine. Allow the engine to idle.
- 3 Fully turn and hold the steering wheel in the left direction and allow the wheels to fully turn to the left. Continue holding the steering while observing the pressure reading on the pressure gauge.
- ⦿ Result: the pressure gauge reads 2610 psi / 180 bar. The pressure setting is correct. Proceed to step 8.
- ✗ Pressure is not within specification. The pressure setting needs to be adjusted. Proceed to step 4.
- 4 Turn the engine off, spot the valve on the power steering and open the cap.
- 5 Adjust the internal hex socket. Turn clockwise to increase the pressure; turn counterclockwise to decrease the pressure.
- 6 Cap the valve.
- 7 Repeat this procedure beginning with step 2.
- 8 Turn the machine off. Remove the pressure gauge from the test port.

MANIFOLDS

How to Remove the Function Manifold

⚠ WARNING Bodily injury hazard. This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools could result in death or serious injury and significant component damage. Dealer service is strongly recommended.

Note: When removing a hose assembly or fitting, the fitting and/or hose end must be torqued to specification during installation. Refer to Section 2, *Hydraulic Hose and Fitting Torque Specifications*.

Note: Perform this procedure with the engine off and cool to the touch.

- 1 Close the hydraulic tank ball valve.
- 2 Remove the central cover of the machine.
- 3 Tag, disconnect and plug the hoses from the function manifold.

⚠ WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 4 Support and secure the function manifold to a suitable lifting device. Do not apply lighting pressure.

- 5 Remove the retaining fasteners securing the function manifold.

- 6 Remove the function manifold.

⚠ WARNING Crushing hazard. The function manifold will fall if not properly supported when the fasteners are removed from the machine.

MANIFOLDS

How to Test the Function Manifold

- 1 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to port TP1 (boom and steering functions hydraulic circuit test port).
 - 2 Start the engine.
 - 3 Increase the engine speed to maximum rpm.
 - 4 Moving the joystick, retract the boom.
- ⦿ Result: the pressure gauge reads 3770 psi / 260 bar. The pump is good.
- ✗ Pressure is not within specification.
Set the valve placed above the manifold.

MANIFOLDS

How to Remove the Auxiliary Function Manifold

⚠ WARNING Bodily injury hazard. This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools could result in death or serious injury and significant component damage. Dealer service is strongly recommended.

Note: When removing a hose assembly or fitting, the fitting and/or hose end must be torqued to specification during installation. Refer to Section 2, *Hydraulic Hose and Fitting Torque Specifications*.

Note: Perform this procedure with the engine off and cool to the touch.

- 1 Close the hydraulic tank ball valve.
- 2 Raise the boom.
- 3 Tag, disconnect and plug the hoses from the function manifold.

⚠ WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 4 Tag and disconnect the harness from the manifold.
- 5 Support and secure the auxiliary function manifold to a suitable lifting device. Do not apply lighting pressure.

- 6 Remove the retaining fasteners securing the auxiliary function manifold.

- 7 Remove the function manifold.

⚠ WARNING Crushing hazard. The function manifold will fall if not properly supported when the fasteners are removed from the machine.

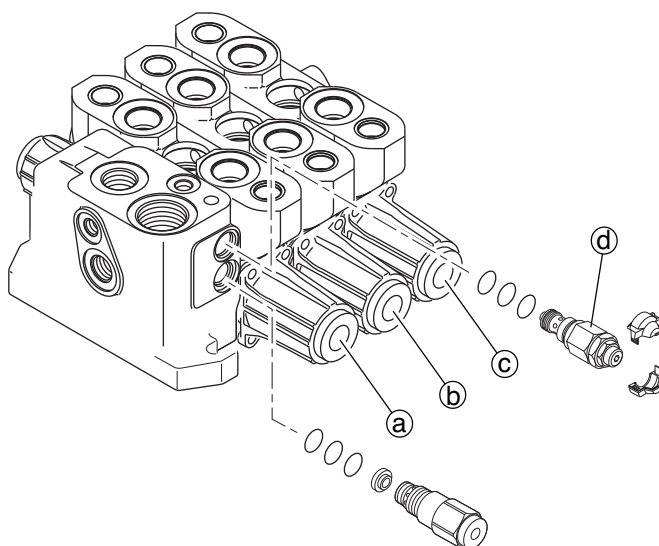
MANIFOLDS

How to Test the Auxiliary Function Manifold

- 1 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to port TP2.
 - 2 Start the engine.
 - 3 Increase the engine speed to maximum rpm.
 - 4 Move the joystick to lock/unlock the attachment.
- ⦿ Result: the pressure gauge reads 3335 psi / 230 bar. The pump is good.
- ✗ Pressure is not within specification.
Set the valve placed above the manifold.

MANIFOLDS

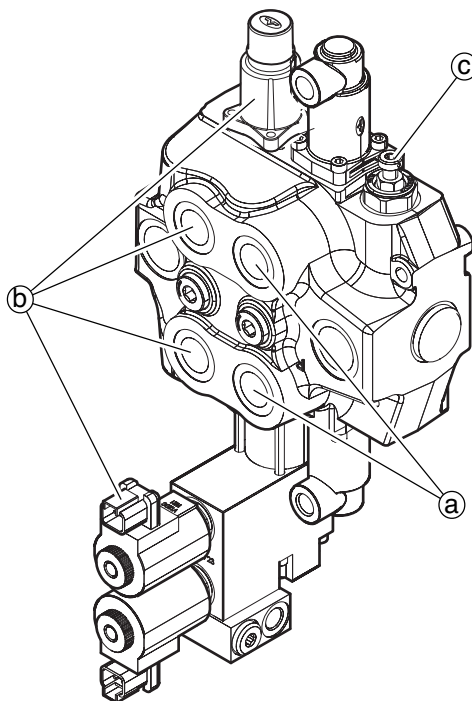
Function Manifold Components



Pos.	Function	Description	Schematic ITEM
a	Boom up/down	Hydraulic proportional control	A1 -B1
b	Boom in/out	Hydraulic proportional control	A2 -B2
c	Fork tilt	Hydraulic proportional control	A3 -B3
d	-	Load Sensing Relief Valve (3770 psi)	-

MANIFOLDS

Auxiliary Function Manifold Components



Pos.	Function	Description	Schematic ITEM
a	Chassis sway function	-	-
b	Boom auxiliary line	ON/OFF solenoid valve	X210 - X211
c	-	Relief Valve (3335 psi)	-

MANIFOLDS

7-2 Valve Coils

How to Test a Coil

A properly functioning coil provides an electromagnetic force which operates the solenoid valve. Critical to normal operation is continuity within the coil. Zero resistance or infinite resistance indicates the coil has failed.

Since coil resistance is sensitive to temperature, resistance values outside specification can produce erratic operation. When coil resistance decreases below specification, amperage increases. As resistance rises above specification, voltage increases.

While valves may operate when coil resistance is outside specification, maintaining coils within specification will help ensure proper valve function over a wide range of operating temperatures.

⚠ WARNING Electrocution/burn hazard.
Contact with electrically charged circuits could result in death or serious injury.
Remove all rings, watches and other jewelry.

Note: If the machine has been in operation, allow the coil to cool at least 3 hours before performing this test.

- 1 Tag and disconnect the wiring from the coil to be tested.
 - 2 Test the coil resistance using a multimeter set to resistance (Ω). Refer to the Valve Coil Resistance Specification table.
- ⓘ Result: If the resistance is not within the adjusted specification, plus or minus 10%, replace the coil.

Valve Coil Resistance Specification

Note: The following coil resistance specifications are at an ambient temperature of 68°F / 20°C. As valve coil resistance is sensitive to changes in air temperature, the coil resistance will typically increase or decrease by 4% for each 18°F / 20°C that your air temperature increases or decreases from 68°F / 20°C.

<i>Description</i>	<i>Specification</i>
Steering modes selector valve, 3 position 4 way 12V DC with diode	5.6 Ω
Mechanical gear speed Selector valve, 3 position 4 way 12V DC with diode	8.8 Ω
Forward/Reverse Selector valve, 3 position 4 way 12V DC with diode	8.8 Ω
Outrigger Selector valve, 2 position 4 way 12V DC with diode	8.8 Ω

MANIFOLDS

How to Test a Coil Diode

Genie incorporates spike suppressing diodes in all of its coils. Properly functioning coil diodes protect the electrical circuit by suppressing voltage spikes. Voltage spikes naturally occur within a function circuit following the interruption of electrical current to a coil. Faulty diodes can fail to protect the electrical system, resulting in a tripped circuit breaker or component damage.

⚠ WARNING Electrocution/burn hazard. Contact with electrically charged circuits could result in death or serious injury. Remove all rings, watches and other jewelry.

- 1 Test the coil for resistance. See 7-2, *How to Test a Coil*.
- 2 Connect a 10Ω resistor to the negative terminal of a known good 9V DC battery. Connect the other end of the resistor to a terminal on the coil.

Resistor. 10Ω

Genie part number	27287
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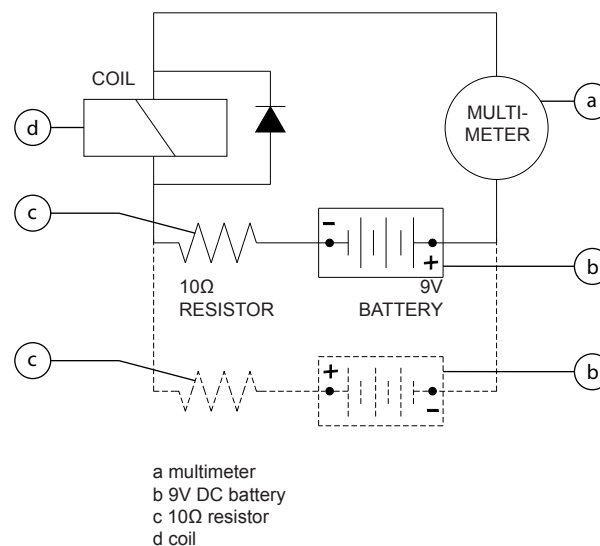
Note: The battery should read 9V DC or more when measured across the terminals.

- 3 Set a multimeter to read DC current.

Note: The multimeter, when set to read DC current, should be capable of reading up to 800 mA.

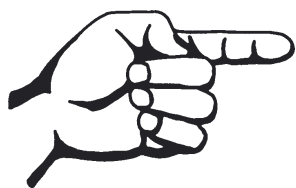
- 4 Connect the negative lead to the other terminal on the coil.

Note: If testing a single-terminal coil, connect the negative lead to the internal metallic ring at either end of the coil.



Note: Dotted lines in illustration indicate a reversed connection as specified in step 6

- 5 Momentarily connect the positive lead from the multimeter to the positive terminal on the 9V battery. Note and record the current reading.
 - 6 At the battery or coil terminals, reverse the connections. Note and record the current reading.
- ⦿ Result: Both current readings are greater than 0 mA and are different by a minimum of 20%. The coil is good.
- ✗ Result: If one or both of the current readings are 0 mA, or if the two current readings do not differ by a minimum of 20%, the coil and/or its internal diode are faulty and the coil should be replaced.



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Fault Codes



Observe and Obey:

- ☑ Troubleshooting and repair procedures shall be completed by a person trained and qualified on the repair of this machine.
- ☑ Immediately tag and remove from service a damaged or malfunctioning machine.
- ☑ Repair any machine damage or malfunction before operating the machine.
- ☑ Unless otherwise specified, perform each repair procedure with the machine in the following configuration:
 - Machine parked on a firm, level surface
 - Boom in the stowed position
 - Key switch in the off position with the key removed
 - Wheels chocked

Before Troubleshooting:

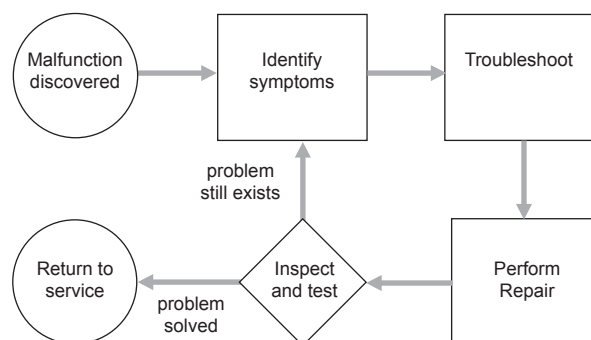
- ☑ Read, understand and obey the safety rules and operating instructions in the appropriate operator's manual on your machine.
- ☑ Be sure that all necessary tools and test equipment are available and ready for use.
- ☑ Be aware of the following hazards and follow generally accepted safe workshop practices.

⚠ DANGER Crushing hazard. When testing or replacing any hydraulic component, always support the structure and secure it from movement.

⚠ WARNING Electrocution/burn hazard. Contact with electrically charged circuits could result in death or serious injury. Remove all rings, watches and other jewelry.

⚠ WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

General Repair Process



FAULT CODES

Diagnostic Display

When the engine Electronic Control Module (ECM) detects an abnormal operating condition, a fault code is immediately stored in the ECM memory. The presence of faults is indicated by the word "SERVICE" (replacing GENIE) on the LCD display which is located on the gauge cluster in the operator's compartment.

The gauge cluster also includes two warning lights.

They are an amber colored light which signals an abnormal engine condition which should be corrected as soon as possible and a red colored light which signals an engine condition which requires the operator to shut down the engine as soon as possible.

The ECM will, in some cases, automatically shut down the engine when the red light is displayed.

Active Fault Codes

To make the active fault codes visible, start the engine, press the diagnostic button "d" and hold it pressed for at least 5 seconds.

To quit the active fault codes page, press the diagnostic button "d" and hold it pressed for at least 5 seconds.

Active Codes vs Stored Codes

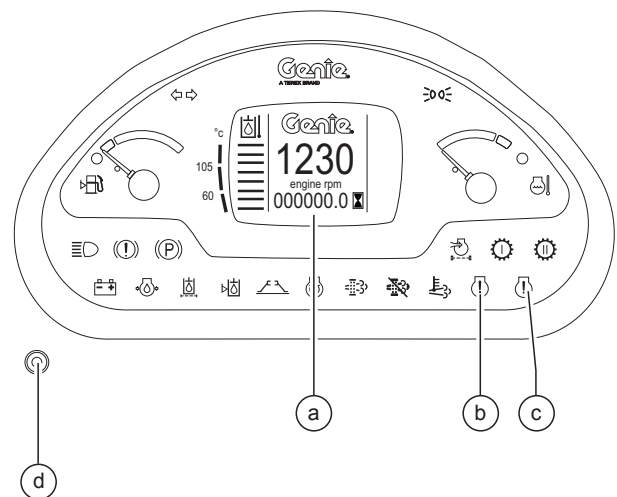
Active fault codes, indicating an engine condition or conditions which have not been corrected, are signaled on the LCD display by the word "SERVICE" replacing "GENIE".

Stored fault codes are the cumulative history of fault codes which the ECM has detected. These fault codes may be recalled by service personnel at a later time even if the condition which caused the engine fault has ceased to exist.

Note: Additional hardware will be necessary to access stored codes.

Decoding Fault Codes

The Suspect Parameter Number (SPN) and the Failure Mode Identifier (FMI), when combined, are the basis for an engine fault code. The SPN number indicates the affected component; the FMI number reveals the type of failure that has occurred. Comparing the combination of numbers to the fault code chart on the following pages will help to determine the exact engine fault and a corrective course of action. For additional information, refer to the engine operator's manual which came with your machine.



Gauge Cluster

- a LCD screen
- b amber warning light
- c stop engine light
- d diagnostic button

FAULT CODES

Engine Fault Codes - Models with Deutz TCD 4.1 L4

SPN	FMI	Short Text Detail
132	11	Air flow sensor load correction factor exceeding the maximum drift limit; plausibility error
132	11	Air flow sensor load correction factor exceeding drift limit; plausibility error
132	11	Air flow sensor low idle correction factor exceeding the maximum drift limit
132	11	Air flow sensor load correction factor exceeding the maximum drift limit
172	2	Sensor ambient air temperature; plausibility error
523006	3	Controller mode switch; short circuit to battery
523006	4	Controller mode switch; short circuit to ground
168	3	Sensor error battery voltage; signal range check high
168	4	Sensor error battery voltage; signal range check low
168	2	High battery voltage; warning threshold exceeded
168	2	Low battery voltage; warning threshold exceeded
597	2	Break lever mainswitch and break lever redundancyswitch status not plausible
523910	14	Air pump doesn't achieve air mass flow setpoint
524013	7	Burner flame unintentional deleted
524020	14	Engine power; Not enough oxygen for regeneration
523911	0	Burner dosing valve (DV2); overcurrent at the end of the injection phase
523911	12	Burner dosing valve (DV2); powerstage over temperature
523911	3	Burner dosing valve (DV2); short circuit to battery
523911	3	Burner dosing valve (DV2); short circuit to battery on high side
523911	4	Burner dosing valve (DV2); short circuit to ground
523911	11	Burner dosing valve (DV2); short circuit high side powerstage
523912	2	Burner dosing valve (DV2) downstream pressure sensor; plausibility error
523912	0	Physical range check high for burner dosing valve (DV2) downstream pressure; shut off regeneration
523912	1	Physical range check low for burner dosing valve (DV2) downstream pressure; shut off regeneration. When burner injector is actuated, the measured pressure does not rise above ca. 1250mbar abs (expected: ca. 2400mbar).
523912	3	Sensor error burner dosing valve (DV2) downstream pressure sensor; signal range check high
523912	4	Sensor error burner dosing valve (DV2) downstream pressure sensor; signal range check low
523913	3	Sensor error glow plug control diagnostic line voltage; signal range check high
523913	4	Sensor error glow plug control diagnostic line voltage; signal range check low
523914	5	Glow plug control; open load

FAULT CODES

523914	12	Glow plug control; powerstage over temperature
523914	3	Glow plug control; short circuit to battery
523914	4	Glow plug control; short circuit to ground
639	14	CAN-Bus 0 "BusOff-Status"
1231	14	CAN-Bus 1 "BusOff-Status"
1235	14	CAN-Bus 2 "BusOff-Status"
102	2	Charged air pressure above warning threshold
102	2	Charged air pressure above shut off threshold
110	3	Sensor error coolant temperature; signal range check high
110	4	Sensor error coolant temperature; signal range check low
110	0	High coolant temperature; warning threshold exceeded
110	0	High coolant temperature; shut off threshold exceeded
111	1	Coolant level too low
523929	0	Fuel Balance Control integrator injector 1 (in firing order); maximum value exceeded
523930	0	Fuel Balance Control integrator injector 2 (in firing order); maximum value exceeded
523931	0	Fuel Balance Control integrator injector 3 (in firing order); maximum value exceeded
523932	0	Fuel Balance Control integrator injector 4 (in firing order); maximum value exceeded
523933	0	Fuel Balance Control integrator injector 5 (in firing order); maximum value exceeded
523934	0	Fuel Balance Control integrator injector 6 (in firing order); maximum value exceeded
523929	1	Fuel Balance Control integrator injector 1 (in firing order); minimum value exceeded
523930	1	Fuel Balance Control integrator injector 2 (in firing order); minimum value exceeded
523931	1	Fuel Balance Control integrator injector 3 (in firing order); minimum value exceeded
523932	1	Fuel Balance Control integrator injector 4 (in firing order); minimum value exceeded
523933	1	Fuel Balance Control integrator injector 5 (in firing order); minimum value exceeded
523934	1	Fuel Balance Control integrator injector 6 (in firing order); minimum value exceeded
1109	2	Engine shut off demand ignored
523698	11	Shut off request from supervisory monitoring function
523717	12	Timeout Error of CAN-Transmit-Frame AmbCon; Weather environments
523603	9	Timeout Error of CAN-Receive-Frame AMB; Ambient Temperature Sensor
3224	2	DLC Error of CAN-Receive-Frame AT1IG1 NOX Sensor (SCR-system upstream cat; DPF-system downstream cat); length of frame incorrect
3224	9	Timeout Error of CAN-Receive-Frame AT1IG1; NOX sensor upstream
3224	2	DLC Error of CAN-Receive-Frame AT1IG1Vol NOX Sensor (SCR-system upstream cat; DPF-system downstream cat); length of frame incorrect
3224	9	Timeout Error of CAN-Receive-Frame AT1IG1Vol; NOX sensor (SCR-system upstream cat; DPF-system downstream cat)

FAULT CODES

523938	9	Timeout Error (BAM to packet) for CAN-Receive-Frame AT1IGCVol1 information; factors & Sensorcalibration for NOX Sensor (SCR-system upstream cat; DPF-system downstream cat)
523939	9	Timeout Error (BAM to BAM) for CAN-Receive-Frame AT1IGCVol1 information; factors & Sensorcalibration for NOX Sensor (SCR-system upstream cat; DPF-system downstream cat)
523940	9	Timeout Error (PCK2PCK) for CAN-Receive-Frame AT1IGCVol1 information; factors & Sensorcalibration for NOX Sensor (SCR-system upstream cat; DPF-system downstream cat)
3234	9	Timeout Error of CAN-Receive-Frame AT1OG1; NOX sensor (SCR-system downstream cat; DPF-system downstream cat)
3234	2	DLC Error of CAN-Receive-Frame AT1O1Vol NOX Sensor (SCR-system downstream cat; DPF-system downstream cat); length of frame incorrect
3234	9	Timeout Error of CAN-Receive-Frame AT1OG1Vol; NOX sensor (SCR-system downstream cat; DPF-system downstream cat)
523941	9	Timeout Error (BAM to packet) for CAN-Receive-Frame AT1OGCVol2 information; factors & Sensorcalibration for NOX Sensor (SCR-system downstream cat; DPF-system downstream cat)
523942	9	Timeout Error (BAM to BAM) for CAN-Receive-Frame AT1OGCVol2 information; factors & Sensorcalibration for NOX Sensor (SCR-system downstream cat; DPF-system downstream cat)
523943	9	Timeout Error (PCK2PCK) for CAN-Receive-Frame AT1OGCVol2 information; factors & Sensorcalibration for NOX Sensor (SCR-system downstream cat; DPF-system downstream cat)
523935	12	Timeout Error of CAN-Transmit-Frame EEC3VOL1; Engine send messages
523936	12	Timeout Error of CAN-Transmit-Frame EEC3VOL2; Engine send messages
523212	9	Timeout Error of CAN-Receive-Frame ComEngPrt; Engine Protection
523240	9	Timeout CAN-message FunModCtl; Function Mode Control
523216	9	Timeout Error of CAN-Receive-Frame PrHtEnCmd; pre-heat command, engine command
523793	9	Timeout Error of CAN-Receive-Frame UAA10; AGS sensor service message
523794	9	Timeout Error of CAN-Receive-Frame UAA11; AGS sensor data
523803	9	Timeout Error of CAN-Receive-Frame RxEngPres; Status burner airpump
523766	9	Timeout Error of CAN-Receive-Frame Active TSC1AE
523767	9	Timeout Error of CAN-Receive-Frame Passive TSC1AE
523768	9	Timeout Error of CAN-Receive-Frame Active TSC1AR
523769	9	Timeout Error of CAN-Receive-Frame Passive TSC1AR
523770	9	Timeout Error of CAN-Receive-Frame Passive TSC1DE
523776	9	Timeout Error of CAN-Receive-Frame TSC1TE -active
523777	9	Passive Timeout Error of CAN-Receive-Frame TSC1TE; Setpoint
523778	9	Active Timeout Error of CAN-Receive-Frame TSC1TR
523779	9	Passive Timeout Error of CAN-Receive-Frame TSC1TR
523788	12	Timeout Error of CAN-Transmit-Frame TrbCH; Status Wastegate
523605	9	Timeout Error of CAN-Receive-Frame TSC1AE; Traction Control
523606	9	Timeout Error of CAN-Receive-Frame TSC1AR; Retarder

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898	9	Timeout Error of CAN-Receive-Frame TSC1TE; Setpoint
520	9	Timeout Error of CAN-Receive-Frame TSC1TR; Setpoint
523867	12	Timeout Error of CAN-Transmit-Frame UAA1 on CAN 2; Burner Air Pump Control
523982	0	Powerstage diagnosis disabled; high battery voltage
523982	1	Powerstage diagnosis disabled; low battery voltage
630	12	Access error EEPROM memory (delete)
630	12	Access error EEPROM memory (read)
630	12	Access error EEPROM memory (write)
411	4	Physical range check low for EGR differential pressure
523612	12	Internal software error ECU; injection cut off
190	0	Engine speed above warning threshold (FOC-Level 1)
190	11	Engine speed above warning threshold (FOC-Level 2)
190	14	Engine speed above warning threshold (Overrun Mode)
108	3	Sensor error ambient air pressure; signal range check high
108	4	Sensor error ambient air pressure; signal range check low
171	3	Sensor error environment temperature; signal range check high
171	4	Sensor error environment temperature; signal range check low
190	8	Sensor camshaft speed; disturbed signal
190	12	Sensor camshaft speed; no signal
190	2	Offset angle between crank-and camshaft sensor is too large
190	8	Sensor crankshaft speed; disturbed signal
190	12	Sensor crankshaft speed; no signal
703	5	Engine running lamp; open load
703	12	Engine running lamp; powerstage over temperature
703	3	Engine running lamp; short circuit to battery
703	4	Engine running lamp; short circuit to ground
975	5	Digital fan control; open load
975	12	Digital fan control; powerstage over temperature
975	3	Digital fan control; short circuit to battery
975	4	Digital fan control; short circuit to ground
975	5	Fan actuator (PWM output); open load
975	12	Fan actuator (PWM output); powerstage over temperature
975	3	Fan actuator (PWM output); short circuit to battery
975	4	Fan actuator (PWM output); short circuit to ground
1639	0	Sensor error fan speed; signal range check high
1639	1	Sensor error fan speed; signal range check low

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523602	0	High fan speed; warning threshold exceeded
523602	0	High fan speed; shut off threshold exceeded
97	3	Sensor error water in fuel; signal range check high
97	4	Sensor error water in fuel; signal range check low
94	3	Sensor error low fuel pressure; signal range check high
94	4	Sensor error low fuel pressure; signal range check low
94	1	Low fuel pressure; warning threshold exceeded
94	1	Low fuel pressure; shut off threshold exceeded
174	0	High low fuel temperature; warning threshold exceeded
174	0	High Low fuel temperature; shut off threshold exceeded
523619	2	Physical range check high for exhaust gas temperature upstream (SCR-CAT)
523915	0	HCI dosing valve (DV1); overcurrent at the end of the injection phase
523915	12	HCI dosing valve (DV1); powerstage over temperature
523915	3	HCI dosing valve (DV1); short circuit to battery
523915	3	HCI dosing valve (DV1); short circuit to battery high side
523915	4	HCI dosing valve (DV1); short circuit to ground
523915	11	HCI dosing valve (DV1); short circuit high side powerstage
523916	2	Sensor HCI dosing valve (DV1) downstream pressure; plausibility error
523916	0	Physical range check high for HCI dosing valve (DV1) downstream pressure; shut off regeneration
523916	1	Physical range check low for HCI dosing valve (DV1) downstream pressure; shut off regeneration
523916	3	Sensor error HCI dosing valve (DV1) downstream pressure; signal range check high
523916	4	Sensor error HCI dosing valve (DV1) downstream pressure; signal range check low
523917	2	Sensor DV1 & DV2 upstream pressure; plausibility error
523917	0	Physical range check high for DV1 & DV2 upstream pressure; shut off regeneration
523917	1	Physical range check low for DV1 & DV2 upstream pressure; shut off regeneration
523917	3	Sensor error DV1 & DV2 upstream pressure; signal range check high
523917	4	Sensor error DV1 & DV2 upstream pressure; signal range check low
523918	2	Sensor DV1 & DV2 upstream temperature; plausibility error
523918	0	Physical range check high for DV1 & DV2 upstream temperature; shut off regeneration
523918	1	Physical range check low for DV1 & DV2 upstream temperature; shut off regeneration
523918	3	Sensor error DV1 & DV2 upstream temperature; signal range check high
523918	4	Sensor error DV1 & DV2 upstream temperature; signal range check low
676	11	Cold start aid relay error.
676	11	Cold start aid relay open load
729	5	Cold start aid relay open load

FAULT CODES

729	12	Cold start aid relay; over temperature error
523895	13	Check of missing injector adjustment value programming (IMA) injector 1 (in firing order)
523896	13	check of missing injector adjustment value programming (IMA) injector 2 (in firing order)
523897	13	check of missing injector adjustment value programming (IMA) injector 3 (in firing order)
523898	13	check of missing injector adjustment value programming (IMA) injector 4 (in firing order)
523899	13	check of missing injector adjustment value programming (IMA) injector 5 (in firing order)
523900	13	check of missing injector adjustment value programming (IMA) injector 6 (in firing order)
523350	4	Injector cylinder-bank 1; short circuit
523352	4	Injector cylinder-bank 2; short circuit
523354	12	Injector powerstage output defect
651	5	Injector 1 (in firing order); interruption of electric connection
652	5	Injector 2 (in firing order); interruption of electric connection
653	5	Injector 3 (in firing order); interruption of electric connection
654	5	Injector 4 (in firing order); interruption of electric connection
655	5	Injector 5 (in firing order); interruption of electric connection
656	5	Injector 6 (in firing order); interruption of electric connection
651	3	Injector 1 (in firing order); short circuit
652	3	Injector 2 (in firing order); short circuit
653	3	Injector 3 (in firing order); short circuit
654	3	Injector 4 (in firing order); short circuit
655	3	Injector 5 (in firing order); short circuit
656	3	Injector 6 (in firing order); short circuit
651	4	High side to low side short circuit in the injector 1 (in firing order)
652	4	High side to low side short circuit in the injector 2 (in firing order)
653	4	High side to low side short circuit in the injector 3 (in firing order)
654	4	High side to low side short circuit in the injector 4 (in firing order)
655	4	High side to low side short circuit in the injector 5 (in firing order)
656	4	High side to low side short circuit in the injector 6 (in firing order)
523615	5	Metering unit (Fuel-System); open load
523615	12	Metering unit (Fuel-System); powerstage over temperature
523615	3	Metering unit (Fuel-System); short circuit to battery highside
523615	4	Metering unit (Fuel-System); short circuit to ground high side
523615	3	Metering unit (Fuel-System); short circuit to battery low side
523615	4	Metering Unit (Fuel-System); short circuit to ground low side
1323	12	Too many recognized misfires in cylinder 1 (in firing order)
1324	12	Too many recognized misfires in cylinder 2 (in firing order)

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1325	12	Too many recognized misfires in cylinder 3 (in firing order)
1326	12	Too many recognized misfires in cylinder 4 (in firing order)
1327	12	Too many recognized misfires in cylinder 5 (in firing order)
1328	12	Too many recognized misfires in cylinder 6 (in firing order)
1322	12	Too many recognized misfires in more than one cylinder
523612	12	Internal ECU monitoring detection reported error
523612	12	Internal ECU monitoring detection reported error
523612	12	Internal ECU monitoring detection reported error
523612	12	Internal ECU monitoring detection reported error
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523612	12	Internal ECU monitoring detection reported error
523612	12	Internal ECU monitoring detection reported error
523008	1	Manipulation control was triggered
523008	2	Timeout error in Manipulation control
100	3	Sensor error oil pressure; signal range check high
100	4	Sensor error oil pressure sensor; signal range check low
100	0	High oil pressure; warning threshold exceeded
100	0	High oil pressure; shut off threshold exceeded
100	1	Low oil pressure; warning threshold exceeded
100	1	Low oil pressure; shut off threshold exceeded
175	2	Sensor oil temperature; plausibility error
175	2	Sensor oil temperature; plausibility error oil temperature too high
175	0	Physical range check high for oil temperature
175	1	Physical range check low for oil temperature
175	3	Sensor error oil temperature; signal range check high
175	4	Sensor error oil temperature; signal range check low
175	0	High oil temperature; warning threshold exceeded

FAULT CODES

175	0	High oil temperature; shut off threshold exceeded
1237	2	Override switch; plausibility error
107	3	Sensor error airfilter differential pressure; short circuit to battery
107	4	Sensor error airfilter differential pressure; short circuit to ground
107	0	High air filter differential pressure; warning threshold exceeded
523919	2	Sensor airpump pressure; plausibility error
523919	0	Physical range check high for airpump pressure; shut off regeneration
523919	1	Physical range check low for airpump pressure; shut off regeneration
523919	3	Sensor error airpump pressure; signal range check high
523919	4	Sensor error airpump pressure; signal range check low
523920	2	Sensor exhaustgas back pressure; plausibility error
523920	0	Physical range check high for exhaustgas back pressure burner; shut off regeneration
523920	1	Physical range check low for exhaustgas back pressure burner; shut off regeneration
523920	3	Sensor error exhaustgas back pressure burner; signal range check high
523920	4	Sensor error exhaustgas back pressure burner; signal range check low
102	3	Sensor error charged air pressure; signal range check high
102	4	Sensor error charged air pressure; signal range check low
411	0	Physical range check high for differential pressure Venturiunit (EGR)
411	1	Physical range check low for differential pressure Venturiunit (EGR)
411	3	Sensor error differential pressure Venturiunit (EGR); signal range check high
411	4	Sensor error differential pressure Venturiunit (EGR); signal range check low
524025	14	Particulate filter; regeneration not succesful
3253	2	Sensor differential pressure (DPF); plausibility error regarding signal offset
3251	0	Physical range check high for differential pressure (DPF); shut off regeneration
3251	1	Physical range check low for differential pressure (DPF); shut off regeneration
3253	3	Sensor error differential pressure (DPF); signal range check high
3253	4	Sensor error differential pressure (DPF); signal range check low
523009	9	Pressure Relief Valve (PRV) reached maximun allowed opening count
523470	2	Pressure Relief Valve (PRV) forced to open; performed by pressure increase
523470	2	Pressure Relief Valve (PRV) forced to open; performed by pressure shock
523470	12	Open Pressure Relief Valve (PRV); shut off condition
523470	12	Open Pressure Relief Valve (PRV); warning condition
523470	14	Pressure Relief Valve (PRV) is open
523470	11	The PRV can not be opened at this operating point with a pressure shock
523470	11	Rail pressure out of tolerance range
523009	10	Pressure relief valve (PRV) reached maximun allowed open time

FAULT CODES

523450	3	Multiple Stage Switch constant speed; short circuit to battery
523450	4	Multiple Stage Switch constant speed; short circuit to ground
523450	2	Multiple Stage Switch constant speed; plausibility error
523451	3	Multiple Stage Switch engine speed control parameter; short circuit to battery
523451	4	Multiple Stage Switch engine speed control parameter; short circuit to ground
523451	2	Multiple Stage Switch engine speed control parameter; plausibility error
523452	3	Multiple Stage Switch engine torque limitation curve; short circuit to battery
523452	4	Multiple Stage Switch engine torque limitation curve; short circuit to ground
523452	2	Multiple Stage Switch engine torque limitation curve; plausibility error
1176	3	Sensor error pressure sensor upstream turbine; signal range check high
1176	4	Sensor error pressure sensor downstream turbine; signal range check high
523613	0	Maximum positive deviation of rail pressure exceeded (RailMeUn0)
523613	0	Maximum positive deviation of rail pressure in metering unit exceeded (RailMeUn1)
523613	0	Railsystem leakage detected (RailMeUn10)
523613	0	Maximum negative deviation of rail pressure in metering unit exceeded (RailMeUn2)
523613	0	Negative deviation of rail pressure second stage (RailMeUn22)
523613	1	Minimum rail pressure exceeded (RailMeUn3)
523613	0	Maximum rail pressure exceeded (RailMeUn4)
523613	2	Setpoint of metering unit in overrun mode not plausible
523470	7	Maximum rail pressure in limp home mode exceeded (PRV)
157	3	Sensor error rail pressure; signal range check high
157	4	Sensor error rail pressure; signal range check low
523633	11	Nox conversion rate insufficient (SCR-Cat defect, bad AdBlue quality)
523633	11	Nox conversion rate insufficient (SCR-Cat defect, bad AdBlue quality); temperature range 1
523633	11	Nox conversion rate insufficient (SCR-Cat defect, bad AdBlue quality); temperature range 2
3234	11	Nox Sensor downstream of SCR Catalysator; plausibility error "stuck in range"
3224	1	Nox sensor upstream of SCR Catalysator; low signal not plausible
4345	11	Sensor backflow line pressure (SCR); plausibility error
4343	11	General pressure check error (SCR)
4374	13	Pressure stabilisation error dosing valve (SCR)
523723	11	Detection of AdBlue filled SCR system in Init-State
523632	16	Pump pressure SCR metering unit too high
523632	18	Pump pressure SCR metering unit too low
523632	0	Pressure overload of SCR-System
523632	1	Pressure build-up error SCR-System
4365	0	Urea tank temperature too high

FAULT CODES

3241	0	Sensor SCR catalyst upstream temperature too high; plausibility error
3241	1	Sensor SCR catalyst upstream temperature too low; plausibility error
3361	7	AdBlue dosing valve blocked (SCR)
523720	2	Sensor urea supply module heater temperature; plausibility error (normal condition)
523720	2	Sensor urea supply module heater temperature; plausibility error (cold start condition)
523721	2	Sensor urea supply module temperature; plausibility error (normal condition)
523721	2	Sensor urea supply module temperature; plausibility error (cold start condition)
523981	11	Urea-tank without heating function (heating phase)
523330	14	Immobilizer status; fuel blocked
523720	8	Urea supply module heater temperature; duty cycle in failure range
523720	8	Urea supply module heater temperature; duty cycle in invalid range
523721	11	Urea supply module temperature measurement not available
523722	8	Urea supply module PWM signal; period outside valid range
523722	8	Detect faulty PWM signal from Supply Modul
523721	8	Urea supply module temperature; duty cycle in failure range
523721	8	Urea supply module temperature; duty cycle in invalid range
29	3	Handthrottle idle validation switch; short circuit to battery
91	8	Accelerator pedal duty cycle PWM signal; signal range check high
91	8	Acceleration pedal cycle duration PWM signal; signal range check high
91	3	Sensor error accelerator pedal; signal range check high
29	3	Sensor error handthrottle; signal range check high
29	4	Handthrottle idle validation switch; short circuit to ground
91	8	Accelerator pedal duty cycle PWM signal; signal range check low
91	8	Acceleration pedal cycle duration PWM signal; signal range check low
91	4	Sensor error accelerator pedal; signal range check low
29	4	Sensor error handthrottle sensor; signal range check low
523921	3	Sensor error burner temperature; signal range check high
3532	3	Sensor error urea tank level; signal range check high
523921	4	Sensor error burner temperature; signal range check low
3532	4	Sensor error urea tank level; signal range check low
1079	13	Sensor supply voltage monitor 1 error (ECU)
1080	13	Sensor supply voltage monitor 2 error (ECU)
523601	13	Sensor supply voltage monitor 3 error (ECU)
677	3	Starter relay high side; short circuit to battery
677	4	Starter relay high side; short circuit to ground
677	5	Starter relay; no load error

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677	12	Starter relay; powerstage over temperature
677	3	Starter relay low side; short circuit to battery
677	4	Starter relay low side; short circuit to ground
523922	5	Burner shut off valve; open load
523922	3	Burner shut of valve; short circuit to battery
523922	4	Burner shut of valve; short circuit to ground
624	5	SVS lamp; open load
624	12	SVS lamp; powerstage over temperature
624	3	SVS lamp; short circuit to battery
624	4	SVS lamp; short circuit to ground
523612	14	Softwarereset CPU SWReset_0
523612	14	Softwarereset CPU SWReset_1
523612	14	Softwarereset CPU SWReset_2
91	11	Plausibility error between APP1 and APP2 or APP1 and idle switch
523550	12	T50 start switch active for too long
172	3	Sensor error intake air; signal range check high
172	4	Sensor error intake air sensor; signal range check low
172	2	Intake air sensor; plausibility error
523921	11	Sensor burner temperature; plausibility error
523921	0	Physical range check high for burner temperature
523921	1	Physical range check low for burner temperature
105	3	Sensor error charged air temperature; signal range check high
105	4	Sensor error charged air temperature; signal range check low
105	0	High charged air cooler temperature; warning threshold exceeded
105	0	High charged air cooler temperature; shut off threshold exceeded
412	3	Sensor error EGR cooler downstream temperature; signal range check high
412	4	Sensor error EGR cooler downstream temperature; signal range check low
523960	0	Physical range check high for EGR cooler downstream temperature
523960	1	Physical range check low for EGR cooler downstream temperature
51	6	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); signal range check high
51	5	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); signal range check low
51	7	Actuator position for EGR-Valve (2.9,3.6) or Throttle-Valve (6.1,7.8) not plausible
51	5	Actuator EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); open load
51	12	Actuator EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); powerstage over temperature
51	3	EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); short circuit to battery
51	4	EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); short circuit to ground

FAULT CODES

51	12	Mechanical actuator defect EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8)
51	6	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); signal range check high
51	5	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); signal range check low
51	3	Position sensor error of actuator EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); signal range check high
51	4	Position sensor error actuator EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); signal range check low
4769	2	Sensor exhaust gas temperature downstream (DOC); plausibility error
4766	0	Physical range check high for exhaust gas temperature downstream (DOC)
4766	1	Physical range check low for exhaust gas temperature downstream (DOC)
4769	3	Sensor error exhaust gas temperature downstream (DOC); signal range check high
4769	4	Sensor error exhaust gas temperature downstream (DOC); signal range check low
4768	2	Sensor exhaust gas temperature upstream (DOC); plausibility error
4765	0	Physical range check high for exhaust gas temperature upstream (DOC)
4765	1	Physical range check low for exhaust gas temperature upstream (DOC)
4768	3	Sensor error exhaust gas temperature upstream (DOC); signal range check high
4768	4	Sensor error exhaust gas temperature upstream (DOC); signal range check low
3248	4	Sensor error particle filter downstream temperature; signal range check low
1180	11	Sensor exhaust gas temperature upstream turbine; plausibility error
1180	3	Sensor error exhaust gas temperature upstream turbine; signal range check high
1180	4	Sensor error exhaust gas temperature upstream turbine; signal range check low
4360	0	Physical range check high for urea catalyst upstream temperature
4360	1	Physical range low for urea catalyst upstream temperature
4360	3	Sensor error urea catalyst exhaust gas temperature upstream; signal range check high
4360	4	Sensor error urea catalyst exhaust gas temperature upstream; signal range check low
1761	14	Urea tank level; warning threshold exceeded
3361	3	Urea dosing valve; short circuit to battery on high side
3361	3	Urea dosing valve; short circuit to battery or open load on high side
3361	4	Urea dosing valve; short circuit to ground or open load on low side
3361	4	Urea dosing valve; short circuit on high side
4345	5	SCR heater relay urea returnline secondary side; open load
4366	5	SCR main relay (secondary side): open load
4343	5	SCR heater relay urea pressureline secondary side; open load
4366	5	SCR main relay (secondary side); Shortcut to battery
4366	5	SCR main relay (secondary side); shortcut to ground
4341	5	SCR heater relay urea supplyline secondary side; open load

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523719	5	SCR heater relay urea supply modul secondary side; open load
4366	5	SCR Tank heating valve secondary side: open load
4243	11	SCR system heater diagnostic reports error; shut off SCR-system
4345	5	SCR heater relay urea returnline primary side; open load
4345	3	SCR heater urea returnline; short circuit to battery
4345	4	SCR heater urea returnline; short circuit to ground
4343	5	SCR heater relay urea pressureline primary side; open load
4343	3	SCR heater urea pressureline; short circuit to battery
4343	4	SCR heater urea pressureline; short circuit to ground
523718	5	SCR main relay (primary side); open load
523718	3	SCR main relay (primary side); short circuit to battery
523718	4	SCR main relay (primary side); short circuit to ground
4341	5	SCR heater relay urea supplyline primary side; open load
4341	3	SCR-heater urea supplyline; short circuit to battery
4341	4	SCR-heater urea supplyline; short circuit to ground
523719	5	SCR heater relay urea supplymodule primary side; open load
523719	3	SCR heater urea supplymodule; short circuit to battery
523719	4	SCR heater urea supplymodule; short circuit to ground
4366	5	SCR tank heating valve primary side; open load
4366	12	SCR-heater relay urea tank powerstage output; over temperature
4366	3	SCR Tank heating valve; short circuit to battery
4366	4	SCR Tank heating valve; short circuit to ground
4375	5	Urea pump motor; open load
4375	3	Urea pump motor; short circuit to battery
4375	4	Urea pump motor; short circuit to ground
4334	0	Physical range check high for Urea Pump Pressure
4334	1	Physical range check low for Urea Pump Pressure
4334	0	Urea pump pressure sensor; high signal not plausible
4334	1	Urea pump pressure sensor; low signal not plausible
4334	3	Sensor error urea pump pressure; signal range check high
4334	4	Sensor error urea pump pressure; signal range check low
4376	5	SCR reversing valve; open load
4376	12	SCR reversing valve; over temperature
4376	3	SCR reversing valve; short circuit to battery
4376	4	SCR reversing valve; short circuit to ground
3031	0	AdBlue-Tank temperature: maximum exceeded

FAULT CODES

3031	1	DEF-Tank temperature: below minimum
3031	3	Sensor error urea tank temperature; short circuit to battery
3031	4	Sensor error urea tank temperature; short circuit to ground
97	12	Water in fuel level prefilter; maximum value exceeded
523946	0	Zerofuel calibration injector 1 (in firing order); maximum value exceeded
523947	0	Zerofuel calibration injector 2 (in firing order); maximum value exceeded
523948	0	Zerofuel calibration injector 3 (in firing order); maximum value exceeded
523949	0	Zerofuel calibration injector 4 (in firing order); maximum value exceeded
523950	0	Zerofuel calibration injector 5 (in firing order); maximum value exceeded
523951	0	Zerofuel calibration injector 6 (in firing order); maximum value exceeded
523946	1	Zerofuel calibration injector 1 (in firing order); minimum value exceeded
523947	1	Zerofuel calibration injector 2 (in firing order); minimum value exceeded
523948	1	Zerofuel calibration injector 3 (in firing order); minimum value exceeded
523949	1	Zerofuel calibration injector 4 (in firing order); minimum value exceeded
523950	1	Zerofuel calibration injector 5 (in firing order); minimum value exceeded
523951	1	Zerofuel calibration injector 6 (in firing order); minimum value exceeded
523612	12	Internal software error ECU
175	2	Customer oiltemperature: signal unplausible
523973	14	SCR Tamper detection; derating timer below limit 1
523974	14	SCR Tamper detection; derating timer below limit 2
523975	14	Urea quality; derating timer below limit 1
523976	14	Urea quality; derating timer below limit 2
523977	14	Urea tank level; derating timer below limit 1
523978	14	Urea tank level; derating timer below limit 2
168	0	Physical range check high for battery voltage
168	1	Physical range check low for battery voltage
172	0	Physical range check high for intake air temperature
172	1	Physical range check low for intake air temperature
523980	14	Bad quality of reduction agent detected
523922	12	Over temperature error on burner shut of valve
1180	0	Physical range check high for exhaust gas temperature upstream turbine
1180	1	Physical range check low for exhaust gas temperature upstream turbine
523914	5	Glow plug control release line; short circuit error
523914	11	Glow plug control; internal error
524018	14	DPF wasn't regenerated, power reduction phase 1 (manuell regeneration request)
524022	14	DPF wasn't regenerated, power reduction phase 2 (manuell regeneration request)

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524023	14	DPF wasn't regenerated, warning condition (manuell regeneration mode)
190	14	Camshaft-and Crankshaft speed sensor signal not available on CAN
51	5	Actuator EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); open load
51	6	Actuator EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); over current
51	12	Actuator EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); over temperature
51	3	EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); short circuit to battery (A02)
51	3	EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); short circuit to battery (A67)
51	4	EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); short circuit to ground (A02)
51	4	EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); short circuit to ground (A67)
51	6	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); Overload by short-circuit
51	11	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); Power stage overtemperature due to high current
51	4	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); Voltage below threshold
523988	5	Charging lamp; open load
523988	12	Charging lamp; over temperature
523988	3	Charging lamp; short circuit to battery
523988	4	Charging lamp; short circuit to ground
524019	11	Air Pump; air lines blocked
523910	9	Air Pump; CAN communication lost
523910	7	Air pump; CAN communication interrupted no purge function available
523910	12	Air Pump; internal error
523910	0	Air Pump; powerstage over temperature
523910	0	Air Pump; operating voltage error
523911	7	Burner dosing valve (DV2); blocked closed
524014	1	Air pressure glow plug flush line; below limit
524013	7	Burner operation is interrupted too often
523915	7	HCI dosing valve (DV1); blocked closed
523915	7	HCI dosing valve (DV1); blocked open
524016	11	HFM sensor; electrical fault
524016	2	Amount of air is not plausible to pump speed
524016	2	Calculated amount of air is not plausible to HFM reading
523910	6	Air Pump; over current
523922	7	Burner Shut Off Valve; blocked closed
524021	11	Burner fuel line pipe leak behind Shut Off Valve
523922	7	Burner Shut Off Valve; blocked open
524017	12	Spark plug control unit (SPCU); electrical fault

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524017	12	Spark plug control unit (SPCU); internal error
523989	0	Fuel Balance Control integrator injector 7 (in firing order); maximum value exceeded
523990	0	Fuel Balance Control integrator injector 8 (in firing order); maximum value exceeded
523989	1	Fuel Balance Control integrator injector 7 (in firing order); minimum value exceeded
523990	1	Fuel Balance Control integrator injector 8 (in firing order); minimum value exceeded
523992	9	Timeout Error of CAN-Receive-Frame DM19Vol1; NOX sensor upstream
523993	9	Timeout Error of CAN-Receive-Frame DM19Vol2; NOX sensor downstream
524038	9	Timeout error of CAN-Receive-Frame ComMS_Sys1TO (error memory Slave); Master-Slave internal CAN message
524039	9	Timeout error of CAN-Receive-Frame ComMS_Sys2TO (error memory Slave); Master-Slave internal CAN message
524040	9	Timeout error of CAN-Receive-Frame ComMS_Sys3TO (error memory Slave); Master-Slave internal CAN message
524041	9	Timeout error of CAN-Receive-Frame ComMS_Sys4TO (error memory Slave); Master-Slave internal CAN message
524042	9	Timeout error of CAN-Receive-Frame ComMS_Sys5TO (error memory Slave); Master-Slave internal CAN message
524043	9	Timeout error of CAN-Receive-Frame ComMS_Sys6TO (error memory Slave); Master-Slave internal CAN message
524045	9	Master-Slave CAN; Message-Counter-Error of CAN-Receive-Frame ComMSMoFOvR
524046	9	Master-Slave CAN; Checksum-Error of CAN-Receive-Frame ComMSMoFOvR
524047	9	Master-Slave CAN; Message-Length-Error of CAN-Receive-Frame ComMSMoFOvR
524048	9	Timeout error CAN message ComMSMoFOvR1TO error memory Slave
524049	9	Message copy error in the Master / Slave data transfer
523788	0	CAN-Transmit-Frame ComTrbChActr "BusOff-Satus"; Wastegate
523788	0	CAN-Transmit-Frame ComTrbChActr disable error; wastegate
523788	0	CAN-Transmit-Frame ComTrbChActr plausibility error; wastegate
523788	0	Timeout Error of CAN-Transmit-Frame ComTrbChActr; Wastegate
524024	11	Deviation of the exhaust gas temperature setpoint to actual value downstream (DOC) too high
523995	13	check of missing injector adjustment value programming (IMA) injector 7 (in firing order)
523996	13	check of missing injector adjustment value programming (IMA) injector 8 (in firing order)
523998	4	Injector cylinder bank 2 slave; short circuit
523999	12	Injector powerstage output Slave defect
524000	5	Injector 7 (in firing order); interruption of electric connection
524001	5	Injector 8 (in firing order); interruption of electric connection
524000	3	Injector 7 (in firing order); short circuit
524001	3	Injector 8 (in firing order); short circuit

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524000	4	High side to low side short circuit in the injector 7 (in firing order)
524001	4	High side to low side short circuit in the injector 8 (in firing order)
2797	4	Injector diagnostics; timeout error of short circuit to ground measurement cyl. Bank 0
2798	4	Injector diagnostics; timeout error of short circuit to ground measurement cyl. Bank 1
2798	4	Injector diagnostics; short circuit to ground monitoring Test in Cyl. Bank 0
2798	4	Injector diagnostics; short circuit to ground monitoring Test in Cyl. Bank 1
524035	12	Injector diagnostics; time out error in the SPI communication
524036	12	Injector diagnostics Slave; time out error in the SPI communication
524004	12	Too many recognized misfires in cylinder 7 (in firing order)
524005	12	Too many recognized misfires in cylinder 8 (in firing order)
524069	9	Timeout Error of CAN-Receive-Frame MSMon_FidFCCTO; Master-Slave CAN communication faulty
524052	11	Error memory Slave reports FID MSMonFC2; Shut-Off Path test error of fuel injection system
524052	11	Error memory Slave reports FID MSMonFC3; timeout of engine state messages (ComMS_Sys1-7) from master ECU
523919	2	Sensor air pump airpressure; plausibility error
523920	2	Sensor exhaust gas back pressure burner; plausibility error
3253	2	Sensor differential pressure (DPF); plausibility error
164	2	Rail pressure safety function is not executed correctly
523922	5	Burner Shut Off Valve; open load
523922	12	Burner Shut Off Valve; powerstage over temperature
523922	4	Burner Shut Off Valve; short circuit to ground
523921	2	Sensor burner temperature; plausibility error
1136	0	Physikal range check high for ECU temperature
1136	1	Physikal range check low for ECU temperature
1136	3	Sensor error ECU temperature; signal range check high
1136	4	Sensor error ECU temperature; signal range check low
4769	2	Sensor exhaust gas temperature OxiCat downstream (normal operation); plausibility error
4769	2	Sensor exhaust gas temperature OxiCat downstream (regeneration); plausibility error
3248	2	Sensor exhaust gas temperature downstream DPF; plausibility error
3248	0	Physical range check high for exhaust gas temperature particulate filter downstream
3248	0	Physical range check high for exhaust gas temperature particulate filter downstream; shut off regeneration
3248	0	Physical range check high for exhaust gas temperature particulate filter downstream; warning
3248	1	Physical range check low for exhaust gas temperature particulate filter downstream
3248	1	Physikal range check low for exhaust gas temperature particulate filter downstream; shut off regeneration

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3248	1	Physical range check low for exhaust gas temperature particulate filter downstream; warning
1188	11	Wastegate actuator; internal error
1188	11	Wastegate actuator; EOL calibration not performed correctly
1188	13	Wastegate actuator calibration deviation too large, recalibration required
1188	2	Wastegate; status message from ECU missing
1188	7	Wastegate actuator; blocked
1188	11	Wastegate actuator; over temperature (> 145°C)
1188	11	Wastegate actuator; over temperature (> 135°C)
1188	11	Wastegate actuator; operating voltage error
524011	0	Zerofuel calibration injector 7 (in firing order); maximum value exceeded
524012	0	Zerofuel calibration injector 8 (in firing order); maximum value exceeded
524011	1	Zerofuel calibration injector 7 (in firing order); minimum value exceeded
524012	1	Zerofuel calibration injector 8 (in firing order); minimum value exceeded
524028	2	CAN message PROEGRActr; plausibility error
524029	2	Timeout Error of CAN-Receive-Frame ComEGRActr -exhaust gas recirculation positioner
524034	5	Disc Separator; open load
524034	12	Disc Separator; powerstage over temperature
524034	3	Disc separator; short circuit to battery
524034	4	Disc separator; short circuit to ground
524030	7	EGR actuator; internal error
524031	13	EGR actuator; calibration error
524032	2	EGR actuator; status message "EGRCust" is missing
524033	7	EGR actuator; due to overload in Save Mode
2621	5	Flush valve burner (EPV DPF-System); open load
2621	12	Flush valve burner (EPV DPF-System); powerstage over temperature
2621	3	Flush valve burner (EPV DPF-System); short circuit to battery
2621	4	Flush valve burner (EPV DPF-System); short circuit to ground
175	0	High customer oil temperature; warning threshold exceeded
175	0	High customer oil temperature; shut off threshold exceeded
3711	12	Regeneration temperature (PFItRgn LigtOff) not reached; regeneration aborted
524055	4	Spark Plug Control Unit (SPCU); short circuit to ground
523960	0	High exhaust gas temperature EGR cooler downstream; warning threshold exceeded
523960	1	High exhaust gas temperature EGR cooler downstream; shut off threshold exceeded
1180	0	Turbocharger Wastegate CAN feedback; warning threshold exceeded
1180	1	Turbocharger Wastegate CAN feedback; shut off threshold exceeded
1180	0	Exhaust gas temperature upstream turbine; warning threshold exceeded

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1180	1	Exhaust gas temperature upstream turbine; shut off threshold exceeded
524037	5	Ashlamp; open load
84	2	Sensor vehicle speed; plausibility error
524037	3	Ashlamp; short circuit to battery
524037	4	Ashlamp; short circuit to ground
524062	12	Regeneration inhibit switch not available; ComInhSwtNA
524062	12	Regeneration release switch not available; ComRegSwtNA
524025	5	DPF system; operating voltage error
524044	9	CAN message ComMS_Sys7 not received from slave
523632	2	Metering control is not performed in time error
524068	2	Master ECU and Slave ECU have been identified as the same types
524052	11	Master ECU and Slave ECU data sets or software are not identical
523718	5	SCR mainrelay; open load (only CV56B)
523718	12	SCR mainrelay; powerstage over temperature (only CV56B)
523718	3	SCR mainrelay; short circuit to battery (only CV56B)
523718	4	SCR mainrelay; short circuit to ground (only CV56B)
4376	5	SCR reversing valve; open load
4376	12	SCR reversing valve; over temperature
4376	4	SCR reversing valve; short circuit to ground
524057	2	Electric fuel pump; fuel pressure build up error
2659	2	Exhaust gas recirculation AGS sensor; plausibility error
2659	0	Physical range check high for EGR exhaust gas mass flow
2659	1	Physical range check low for EGR exhaust gas mass flow
2659	12	Exhaust gas recirculation; AGS sensor has "burn off" not performed
2659	2	AGS sensor temperature exhaust gas mass flow; plausibility error
3699	14	Maximum stand-still-duration reached; oil exchange required
3699	2	DPF differential pressure sensor and a further sensor or actuator CRT system defective
3699	2	Temperature sensor us. and ds. DOC simultaneously defect
524114	9	Timeout error of CAN-Transmit-Frame A1DOC
524115	9	Timeout error of CAN-Transmit-Frame AT1S
524116	9	Timeout error of CAN-Transmit-Frame SCR2
524117	9	Timeout error of CAN-Transmit-Frame SCR3
524097	9	Timeout error of CAN-Transmit-Frame DPFBnAirPmpCtl
524098	9	Timeout error of CAN-Transmit-Frame ComDPFBnPT
524099	9	Timeout error of CAN-Transmit-Frame ComDPFC1
524100	9	Timeout error of CAN-Transmit-Frame ComDPFHisDat

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524101	9	Timeout error of CAN-Transmit-Frame ComDPFTstMon
524105	9	Timeout error of CAN-Transmit-Frame ComEGRMsFlw
524108	9	Timeout error of CAN-Transmit-Frame ComEGRTVActr
524110	9	Timeout error of CAN-Transmit-Frame ComETVActr
524112	9	Timeout ComITVActr
524118	9	Timeout error of CAN-Receive-Frame ComRxCM1
524119	9	Timeout error of CAN-Receive-Frame ComRxCustSCR3
524102	9	Timeout error of CAN-Receive-Frame ComRxDPFBrnAirPmpCtl
524103	9	Timeout error of CAN-Receive-Frame ComRxDPFBrnAirPmp
29	3	Handthrottle idle validation switch; short circuit to battery
29	3	Sesnor error handthrottle; signal range check high
29	4	Handthrottle idle validation switch; short circuit to ground
29	4	Sensor error handthrottle sensor; signal range check low
51	3	EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); short circuit to battery
51	3	Position sensor error of actuator EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); signal range check high
51	3	EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); short circuit to battery (A02)
51	3	EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); short circuit to battery (A67)
51	4	EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); short circuit to ground
51	4	Position sensor error actuator EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); signal range check low
51	4	EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); short circuit to ground (A02)
51	4	EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); short circuit to ground (A67)
51	4	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); Voltage below threshold
51	5	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); signal range check low
51	5	Actuator EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); open load
51	5	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); signal range check low
51	5	Actuator EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); open load
51	6	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); signal range check high
51	6	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); signal range check high
51	6	Actuator EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); over current
51	6	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); Overload by short-circuit
51	7	Actuator position for EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8) not plausible
51	11	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); Power stage overtemperature due to high current
51	12	Actuator EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); powerstage over temperature

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51	12	Mechanical actuator defect EGR-Valve (2.9,3.6) or Throttle-Valve (6.1,7.8)
51	12	Actuator EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); over temperature
84	2	Sensor vehicle speed; plausibility error
91	3	Sensor error accelerator pedal; signal range check high
91	4	Sensor error accelerator pedal; signal range check low
91	8	Accelerator pedal duty cycle PWM signal; signal range check high
91	8	Acceleration pedal cycle duration PWM signal; signal range check high
91	8	Accelerator pedal dutycycle PWM signal; signal range check low
91	8	Acceleration pedal cycle duration PWM signal; signal range check low
91	11	Plausibility error between APP1 and APP2 or APP1 and idle switch
94	1	Low fuel pressure; warning threshold exceeded
94	1	Low fuel pressure; shut off threshold exceeded
94	3	Sensor error low fuel pressure; signal range check high
94	4	Sensor error low fuel pressure; signal range check low
97	3	Sensor error water in fuel; signal range check high
97	4	Sensor error water in fuel; signal range check low
97	12	Water in fuel level prefilter; maximum value exceeded
100	0	High oil pressure; warning threshold exceeded
100	0	High oil pressure; shut off threshold exceeded
100	1	Low oil pressure; warning threshold exceeded
100	1	Low oil pressure; shut off threshold exceeded
100	3	Sensor error oil pressure; signal range check high
100	4	Sensor error oil pressure sensor; signal range check low
102	2	Charged air pressure above warning threshold
102	2	Charged air pressure above shut off threshold
102	3	Sensor error charged air pressure; signal range check high
102	4	Sensor error charged air pressure; signal range check low
105	0	High charged air cooler temperature; warning threshold exceeded
105	0	High charged air cooler temperature; shut off threshold exceeded
105	3	Sensor error charged air temperature; signal range check high
105	4	Sensor error charged air temperature; signal range check low
107	0	High air filter differential pressure; warning threshold exceeded
107	3	Sensor error airfilter differential pressure; short circuit to battery
107	4	Sensor error airfilter differential pressure; short circuit to ground
108	3	Sensor error ambient air pressure; signal range check high
108	4	Sensor error ambient air pressure; signal range check low

FAULT CODES

110	0	High coolant temperature; warning threshold exceeded
110	0	High coolant temperature; shut off threshold exceeded
110	3	Sensor error coolant temperature; signal range check high
110	4	Sensor error coolant temperature; signal range check low
111	1	Coolant level too low
132	11	Air flow sensor load correction factor exceeding the maximum drift limit; plausibility error
132	11	Air flow sensor load correction factor exceeding drift limit; plausibility error
132	11	Air flow sensor low idle correction factor exceeding the maximum drift limit
132	11	Air flow sensor load correction factor exceeding the maximum drift limit
157	3	Sensor error rail pressure; signal range check high
157	4	Sensor error rail pressure; signal range check low
164	2	Rail pressure safety function is not executed correctly
168	0	Physical range check high for battery voltage
168	1	Physical range check low for battery voltage
168	2	High battery voltage; warning threshold exceeded
168	2	Low battery voltage; warning threshold exceeded
168	3	Sensor error battery voltage; signal range check high
168	4	Sensor error battery voltage; signal range check low
171	3	Sensor error environment temperature; signal range check high
171	4	Sensor error environment temperature; signal range check low
172	0	Physical range check high for intake air temperature
172	1	Physical range check low for intake air temperature
172	2	Sensor ambient air temperature; plausibility error
172	2	Intake air sensor; plausibility error
172	3	Sensor error intake air; signal range check high
172	4	Sensor error intake air sensor; signal range check low
174	0	High low fuel temperature; warning threshold exceeded
174	0	High Low fuel temperature; shut off threshold exceeded
175	0	Physical range check high for oil temperature
175	0	High oil temperature; warning threshold exceeded
175	0	High oil temperature; shut off threshold exceeded
175	0	High customer oil temperature; warning threshold exceeded
175	0	High customer oil temperature; shut off threshold exceeded
175	1	Physical range check low for oil temperature
175	2	Sensor oil temperature; plausibility error
175	2	Sensor oil temperature; plausibility error oil temperature too high

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175	2	Customer oiltemperature: signal unplausible
175	3	Sensor error oil temperature; signal range check high
175	4	Sensor error oil temperature; signal range check low
190	0	Engine speed above warning threshold (FOC-Level 1)
190	2	Offset angle between crank-and camshaft sensor is too large
190	8	Sensor camshaft speed; disturbed signal
190	8	Sensor crankshaft speed; disturbed signal
190	11	Engine speed above warning threshold (FOC-Level 2)
190	12	Sensor camshaft speed; no signal
190	12	Sensor crankshaft speed; no signal
190	14	Engine speed above warning threshold (Overrun Mode)
190	14	Camshaft-and Crankshaft speed sensor signal not available on CAN
411	0	Physical range check high for differential pressure Venturiunit (EGR)
411	1	Physical range check low for differential pressure Venturiunit (EGR)
411	3	Sensor error differential pressure Venturiunit (EGR); signal range check high
411	4	Physical range check low for EGR differential pressure
411	4	Sensor error differential pressure Venturiunit (EGR); signal range check low
412	3	Sensor error EGR cooler downstream temperature; signal range check high
412	4	Sensor error EGR cooler downstream temperature; signal range check low
520	9	Timeout Error of CAN-Receive-Frame TSC1TR; Setpoint
597	2	Break lever mainswitch and break lever redundancyswitch status not plausible
624	3	SVS lamp; short circuit to battery
624	4	SVS lamp; short circuit to ground
624	5	SVS lamp; open load
624	12	SVS lamp; powerstage over temperature
630	12	Access error EEPROM memory (delete)
630	12	Access error EEPROM memory (read)
630	12	Access error EEPROM memory (write)
639	14	CAN-Bus 0 "BusOff-Status"
651	3	Injector 1 (in firing order); short circuit
651	4	High side to low side short circuit in the injector 1 (in firing order)
651	5	Injector 1 (in firing order); interruption of electric connection
652	3	Injector 2 (in firing order); short circuit
652	4	High side to low side short circuit in the injector 2 (in firing order)
652	5	Injector 2 (in firing order); interruption of electric connection
653	3	Injector 3 (in firing order); short circuit

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653	4	High side to low side short circuit in the injector 3 (in firing order)
653	5	Injector 3 (in firing order); interruption of electric connection
654	3	Injector 4 (in firing order); short circuit
654	4	High side to low side short circuit in the injector 4 (in firing order)
654	5	Injector 4 (in firing order); interruption of electric connection
655	3	Injector 5 (in firing order); short circuit
655	4	High side to low side short circuit in the injector 5 (in firing order)
655	5	Injector 5 (in firing order); interruption of electric connection
656	3	Injector 6 (in firing order); short circuit
656	4	High side to low side short circuit in the injector 6 (in firing order)
656	5	Injector 6 (in firing order); interruption of electric connection
676	11	Cold start aid relay error.
676	11	Cold start aid relay open load
677	3	Starter relay high side; short circuit to battery
677	3	Starter relay low side; short circuit to battery
677	4	Starter relay high side; short circuit to ground
677	4	Starter relay low side; short circuit to ground
677	5	Starter relay; no load error
677	12	Starter relay; powerstage over temperature
703	3	Engine running lamp; short circuit to battery
703	4	Engine running lamp; short circuit to ground
703	5	Engine running lamp; open load
703	12	Engine running lamp; powerstage over temperature
729	5	Cold start aid relay open load
729	12	Cold start aid relay; over temperature error
898	9	Timeout Error of CAN-Receive-Frame TSC1TE; Setpoint
975	3	Digital fan control; short circuit to battery
975	3	Fan actuator (PWM output); short circuit to battery
975	4	Digital fan control; short circuit to ground
975	4	Fan actuator (PWM output); short circuit to ground
975	5	Digital fan control; open load
975	5	Fan actuator (PWM output); open load
975	12	Digital fan control; powerstage over temperature
975	12	Fan actuator (PWM output); powerstage over temperature
1079	13	Sensor supply voltage monitor 1 error (ECU)
1080	13	Sensor supply voltage monitor 2 error (ECU)

FAULT CODES

1109	2	Engine shut off demand ignored
1136	0	Physical range check high for ECU temperature
1136	1	Physical range check low for ECU temperature
1136	3	Sensor error ECU temperature; signal range check high
1136	4	Sensor error ECU temperature; signal range check low
1176	3	Sensor error pressure sensor upstream turbine; signal range check high
1176	4	Sensor error pressure sensor downstream turbine; signal range check high
1180	0	Physical range check high for exhaust gas temperature upstream turbine
1180	0	Turbocharger Wastegate CAN feedback; warning threshold exceeded
1180	0	Exhaust gas temperature upstream turbine; warning threshold exceeded
1180	1	Physical range check low for exhaust gas temperature upstream turbine
1180	1	Turbocharger Wastegate CAN feedback; shut off threshold exceeded
1180	1	Exhaust gas temperature upstream turbine; shut off threshold exceeded
1180	3	Sensor error exhaust gas temperature upstream turbine; signal range check high
1180	4	Sensor error exhaust gas temperature upstream turbine; signal range check low
1180	11	Sensor exhaust gas temperature upstream turbine; plausibility error
1188	2	Wastegate; status message from ECU missing
1188	7	Wastegate actuator; blocked
1188	11	Wastegate actuator; internal error
1188	11	Wastegate actuator; EOL calibration not performed correctly
1188	11	Wastegate actuator; over temperature (> 145°C)
1188	11	Wastegate actuator; over temperature (> 135°C)
1188	11	Wastegate actuator; operating voltage error
1188	13	Wastegate actuator calibration deviation too large, recalibration required
1231	14	CAN-Bus 1 "BusOff-Status"
1235	14	CAN-Bus 2 "BusOff-Status"
1237	2	Override switch; plausibility error
1322	12	Too many recognized misfires in more than one cylinder
1323	12	Too many recognized misfires in cylinder 1 (in firing order)
1324	12	Too many recognized misfires in cylinder 2 (in firing order)
1325	12	Too many recognized misfires in cylinder 3 (in firing order)
1326	12	Too many recognized misfires in cylinder 4 (in firing order)
1327	12	Too many recognized misfires in cylinder 5 (in firing order)
1328	12	Too many recognized misfires in cylinder 6 (in firing order)
1639	0	Sensor error fan speed; signal range check high
1639	1	Sensor error fan speed; signal range check low

FAULT CODES

1761	14	Urea tank level; warning threshold exceeded
2621	3	Flush valve burner (EPV DPF-System); short circuit to battery
2621	4	Flush valve burner (EPV DPF-System); short circuit to ground
2621	5	Flush valve burner (EPV DPF-System); open load
2621	12	Flush valve burner (EPV DPF-System); powerstage over temperature
2659	0	Physical range check high for EGR exhaust gas mass flow
2659	1	Physical range check low for EGR exhaust gas mass flow
2659	2	Exhaust gas recirculation AGS sensor; plausibility error
2659	2	AGS sensor temperature exhaust gas mass flow; plausibility error
2659	12	Exhaust gas recirculation; AGS sensor has "burn off" not performed
2797	4	Injector diagnostics; timeout error of short circuit to ground measurement cyl. Bank 0
2798	4	Injector diagnostics; timeout error of short circuit to ground measurement cyl. Bank 1
2798	4	Injector diagnostics; short circuit to ground monitoring Test in Cyl. Bank 0
2798	4	Injector diagnostics; short circuit to ground monitoring Test in Cyl. Bank 1
3031	0	AdBlue-Tank temperature: maximum exceeded
3031	1	DEF-Tank temperature: below minimum
3031	3	Sensor error urea tank temperature; short circuit to battery
3031	4	Sensor error urea tank temperature; short circuit to ground
3224	1	Nox sensor upstream of SCR Catalysator; low signal not plausible
3224	2	DLC Error of CAN-Receive-Frame AT1IG1 NOX Sensor (SCR-system upstream cat; DPF-system downstream cat); length of frame incorrect
3224	2	DLC Error of CAN-Receive-Frame AT1IG1Vol NOX Sensor (SCR-system upstream cat; DPF-system downstream cat); length of frame incorrect
3224	9	Timeout Error of CAN-Receive-Frame AT1IG1; NOX sensor upstream
3224	9	Timeout Error of CAN-Receive-Frame AT1IG1Vol; NOX sensor (SCR-system upstream cat; DPF-system downstream cat)
3234	2	DLC Error of CAN-Receive-Frame AT1O1Vol NOX Sensor (SCR-system downstream cat; DPF-system downstream cat); length of frame incorrect
3234	9	Timeout Error of CAN-Receive-Frame AT1OG1; NOX sensor (SCR-system downstream cat; DPF-system downstream cat)
3234	9	Timeout Error of CAN-Receive-Frame AT1OG1Vol; NOX sensor (SCR-system downstream cat; DPF-system downstream cat)
3234	11	Nox Sensor downstream of SCR Catalysator; plausibility error "stuck in range"
3241	0	Sensor SCR catalyst upstream temperature too high; plausibility error
3241	1	Sensor SCR catalyst upstream temperature too low; plausibility error
3248	0	Physical range check high for exhaust gas temperature particulate filter downstream

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3248	0	Physical range check high for exhaust gas temperature particulate filter downstream; shut off regeneration
3248	0	Physical range check high for exhaust gas temperature particulate filter downstream; warning
3248	1	Physical range check low for exhaust gas temperature particulate filter downstream
3248	1	Physical range check low for exhaust gas temperature particulate filter downstream; shut off regeneration
3248	1	Physical range check low for exhaust gas temperature particulate filter downstream; warning
3248	2	Sensor exhaust gas temperature downstream DPF; plausibility error
3248	4	Sensor error particle filter downstream temperature; signal range check low
3251	0	Physical range check high for differential pressure (DPF); shut off regeneration
3251	1	Physical range check low for differential pressure (DPF); shut off regeneration
3253	2	Sensor differential pressure (DPF); plausibility error regarding signal offset
3253	2	Sensor differential pressure (DPF); plausibility error
3253	3	Sensor error differential pressure (DPF); signal range check high
3253	4	Sensor error differential pressure (DPF); signal range check low
3361	3	Urea dosing valve; short circuit to battery on high side
3361	3	Urea dosing valve; short circuit to battery or open load on high side
3361	4	Urea dosing valve; short circuit to ground or open load on low side
3361	4	Urea dosing valve; short circuit on high side
3361	7	AdBlue dosing valve blocked (SCR)
3532	3	Sensor error urea tank level; signal range check high
3532	4	Sensor error urea tank level; signal range check low
3699	2	DPF differential pressure sensor and a further sensor or actuator CRT system defective
3699	2	Temperature sensor us. and ds. DOC simultaneously defect
3699	14	Maximum stand-still-duration reached; oil exchange required
3711	12	Regeneration temperature (PFItRgn LigtOff) not reached; regeneration aborted
4243	11	SCR system heater diagnostic reports error; shut off SCR-system
4334	0	Physical range check high for Urea Pump Pressure
4334	0	Urea pump pressure sensor; high signal not plausible
4334	1	Physical range check low for Urea Pump Pressure
4334	1	Urea pump pressure sensor; low signal not plausible
4334	3	Sensor error urea pump pressure; signal range check high
4334	4	Sensor error urea pump pressure; signal range check low
4341	3	SCR-heater urea supplyline; short circuit to battery
4341	4	SCR-heater urea supplyline; short circuit to ground
4341	5	SCR heater relay urea supplyline secondary side; open load

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4341	5	SCR heater relay urea supplyline primary side; open load
4343	3	SCR heater urea pressureline; short circuit to battery
4343	4	SCR heater urea pressureline; short circuit to ground
4343	5	SCR heater relay urea pressureline secondary side; open load
4343	5	SCR heater relay urea pressureline primary side; open load
4343	11	General pressure check error (SCR)
4345	3	SCR heater urea returnline; short circuit to battery
4345	4	SCR heater urea returnline; short circuit to ground
4345	5	SCR heater relay urea returnline secondary side; open load
4345	5	SCR heater relay urea returnline primary side; open load
4345	11	Sensor backflow line pressure (SCR); plausibility error
4360	0	Physical range check high for urea catalyst upstream temperature
4360	1	Physical range low for urea catalyst upstream temperature
4360	3	Sensor error urea catalyst exhaust gas temperature upstream; signal range check high
4360	4	Sensor error urea catalyst exhaust gas temperature upstream; signal range check low
4365	0	Urea tank temperature too high
4366	3	SCR Tank heating valve; short circuit to battery
4366	4	SCR Tank heating valve; short circuit to ground
4366	5	SCR main relay (secondary side): open load
4366	5	SCR main relay (secondary side); Shortcut to battery
4366	5	SCR main relay (secondary side); shortcut to ground
4366	5	SCR Tank heating valve secondary side: open load
4366	5	SCR tank heating valve primary side; open load
4366	12	SCR-heater relay urea tank powerstage output; over temperature
4374	13	Pressure stabilisation error dosing valve (SCR)
4375	3	Urea pump motor; short circuit to battery
4375	4	Urea pump motor; short circuit to ground
4375	5	Urea pump motor; open load
4376	3	SCR reversing valve; short circuit to battery
4376	4	SCR reversing valve; short circuit to ground
4376	4	SCR reversing valve; short circuit to ground
4376	5	SCR reversing valve; open load
4376	5	SCR reversing valve; open load
4376	12	SCR reversing valve; over temperature
4376	12	SCR reversing valve; over temperature
4765	0	Physical range check high for exhaust gas temperature upstream (DOC)

FAULT CODES

4765	1	Physical range check low for exhaust gas temperature upstream (DOC)
4766	0	Physical range check high for exhaust gas temperature downstream (DOC)
4766	1	Physical range check low for exhaust gas temperature downstream (DOC)
4768	2	Sensor exhaust gas temperature upstream (DOC); plausibility error
4768	3	Sensor error exhaust gas temperature upstream (DOC); signal range check high
4768	4	Sensor error exhaust gas temperature upstream (DOC); signal range check low
4769	2	Sensor exhaust gas temperature downstream (DOC); plausibility error
4769	2	Sensor exhaust gas temperature OxiCat downstream (normal operation); plausibility error
4769	2	Sensor exhaust gas temperature OxiCat downstream (regeneration); plausibility error
4769	3	Sensor error exhaust gas temperature downstream (DOC); signal range check high
4769	4	Sensor error exhaust gas temperature downstream (DOC); signal range check low
523006	3	Controller mode switch; short circuit to battery
523006	4	Controller mode switch; short circuit to ground
523008	1	Manipulation control was triggered
523008	2	Timeout error in Manipulation control
523009	9	Pressure Relief Valve (PRV) reached maximum allowed opening count
523009	10	Pressure relief valve (PRV) reached maximum allowed open time
523212	9	Timeout Error of CAN-Receive-Frame ComEngPrt; Engine Protection
523216	9	Timeout Error of CAN-Receive-Frame PrHtEnCmd; pre-heat command, engine command
523240	9	Timeout CAN-message FunModCtl; Function Mode Control
523330	14	Immobilizer status; fuel blocked
523350	4	Injector cylinder-bank 1; short circuit
523352	4	Injector cylinder-bank 2; short circuit
523354	12	Injector powerstage output defect
523450	2	Multiple Stage Switch constant speed; plausibility error
523450	3	Multiple Stage Switch constant speed; short circuit to battery
523450	4	Multiple Stage Switch constant speed; short circuit to ground
523451	2	Multiple Stage Switch engine speed control parameter; plausibility error
523451	3	Multiple Stage Switch engine speed control parameter; short circuit to battery
523451	4	Multiple Stage Switch engine speed control parameter; short circuit to ground
523452	2	Multiple Stage Switch engine torque limitation curve; plausibility error
523452	3	Multiple Stage Switch engine torque limitation curve; short circuit to battery
523452	4	Multiple Stage Switch engine torque limitation curve; short circuit to ground
523470	2	Pressure Relief Valve (PRV) forced to open; performed by pressure increase
523470	2	Pressure Relief Valve (PRV) forced to open; performed by pressure shock
523470	7	Maximum rail pressure in limp home mode exceeded (PRV)

FAULT CODES

[illegible]

FAULT CODES

523613	0	Maximum negative deviation of rail pressure in metering unit exceeded (RailMeUn2)
523613	0	Negative deviation of rail pressure second stage (RailMeUn22)
523613	0	Maximum rail pressure exceeded (RailMeUn4)
523613	1	Minimum rail pressure exceeded (RailMeUn3)
523613	2	Setpoint of metering unit in overrun mode not plausible
523615	3	Metering unit (Fuel-System); short circuit to battery highside
523615	3	Metering unit (Fuel-System); short circuit to battery low side
523615	4	Metering unit (Fuel-System); short circuit to ground high side
523615	4	Metering Unit (Fuel-System); short circuit to ground low side
523615	5	Metering unit (Fuel-System); open load
523615	12	Metering unit (Fuel-System); powerstage over temperature
523619	2	Physical range check high for exhaust gas temperature upstream (SCR-CAT)
523632	0	Pressure overload of SCR-System
523632	1	Pressure build-up error SCR-System
523632	2	Metering control is not performed in time error
523632	16	Pump pressure SCR metering unit too high
523632	18	Pump pressure SCR metering unit too low
523633	11	Nox conversion rate insufficient (SCR-Cat defect, bad AdBule quality)
523633	11	Nox conversion rate insufficient (SCR-Cat defect, bad AdBule quality); temperature range 1
523633	11	Nox conversion rate insufficient (SCR-Cat defect, bad AdBule quality); temperature range 2
523698	11	Shut off request from supervisory monitoring function
523717	12	Timeout Error of CAN-Transmit-Frame AmbCon; Weather environments
523718	3	SCR main relay (primary side); short circuit to battery
523718	3	SCR mainrelay; short circuit to battery (only CV56B)
523718	4	SCR main relay (primary side); short circuit to ground
523718	4	SCR mainrelay; short circuit to ground (only CV56B)
523718	5	SCR main relay (primary side); open load
523718	5	SCR mainrelay; open load (only CV56B)
523718	12	SCR mainrelay; powerstage over temperature (only CV56B)
523719	3	SCR heater urea supplymodule; short circuit to battery
523719	4	SCR heater urea supplymodule; short circuit to ground
523719	5	SCR heater relay urea supply modul secondary side; open load
523719	5	SCR heater relay urea supplymodule primary side; open load
523720	2	Sensor urea supply module heater temperature; plausibility error (normal condition)
523720	2	Sensor urea supply module heater temperature; plausibility error (cold start condition)
523720	8	Urea supply module heater temperature; duty cycle in failure range

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523720	8	Urea supply module heater temperature; duty cycle in invalid range
523721	2	Sesnor urea supply module temperature; plausibility error (normal condition)
523721	2	Sensor urea supply module temperature; plausibility error (cold start condition)
523721	8	Urea supply module temperature; duty cycle in failure range
523721	8	Urea supply module temperature; duty cycle in invalid range
523721	11	Urea supply module temperature measurement not available
523722	8	Urea supply module PWM signal; period outside valid range
523722	8	Detect faulty PWM signal from Supply Modul
523723	11	Detection of AdBlue filled SCR system in Init-State
523766	9	Timeout Error of CAN-Receive-Frame Active TSC1AE
523767	9	Timeout Error of CAN-Receive-Frame Passive TSC1AE
523768	9	Timeout Error of CAN-Receive-Frame Active TSC1AR
523769	9	Timeout Error of CAN-Receive-Frame Passive TSC1AR
523770	9	Timeout Error of CAN-Receive-Frame Passive TSC1DE
523776	9	Timeout Error of CAN-Receive-Frame TSC1TE -active
523777	9	Passive Timeout Error of CAN-Receive-Frame TSC1TE; Setpoint
523778	9	Active Timeout Error of CAN-Receive-Frame TSC1TR
523779	9	Passive Timeout Error of CAN-Receive-Frame TSC1TR
523788	0	CAN-Transmit-Frame ComTrbChActr "BusOff-Satus"; Wastegate
523788	0	CAN-Transmit-Frame ComTrbChActr disable error; wastegate
523788	0	CAN-Transmit-Frame ComTrbChActr plausibility error; wastegate
523788	0	Timeout Error of CAN-Transmit-Frame ComTrbChActr; Wastegate
523788	12	Timeout Error of CAN-Transmit-Frame TrbCH; Status Wastegate
523793	9	Timeout Error of CAN-Receive-Frame UAA10; AGS sensor service message
523794	9	Timeout Error of CAN-Receive-Frame UAA11; AGS sensor data
523803	9	Timeout Error of CAN-Receive-Frame RxEngPres; Status burner airpump
523867	12	Timeout Error of CAN-Transmit-Frame UAA1 on CAN 2; Burner Air Pump Control
523895	13	Check of missing injector adjustment value programming (IMA) injector 1 (in firing order)
523896	13	check of missing injector adjustment value programming (IMA) injector 2 (in firing order)
523897	13	check of missing injector adjustment value programming (IMA) injector 3 (in firing order)
523898	13	check of missing injector adjustment value programming (IMA) injector 4 (in firing order)
523899	13	check of missing injector adjustment value programming (IMA) injector 5 (in firing order)
523900	13	check of missing injector adjustment value programming (IMA) injector 6 (in firing order)
523910	0	Air Pump; powerstage over temperature
523910	0	Air Pump; operating voltage error
523910	6	Air Pump; over current

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523910	7	Air pump; CAN communication interrupted no purge function available
523910	9	Air Pump; CAN communication lost
523910	12	Air Pump; internal error
523910	14	Air pump doesn't achieve air mass flow setpoint
523911	0	Burner dosing valve (DV2); overcurrent at the end of the injection phase
523911	3	Burner dosing valve (DV2); short circuit to battery
523911	3	Burner dosing valve (DV2); short circuit to battery on high side
523911	4	Burner dosing valve (DV2); short circuit to ground
523911	7	Burner dosing valve (DV2); blocked closed
523911	11	Burner dosing valve (DV2); short circuit high side powerstage
523911	12	Burner dosing valve (DV2); powerstage over temperature
523912	0	Physical range check high for burner dosing valve (DV2) downstream pressure; shut off regeneration
523912	1	Physical range check low for burner dosing valve (DV2) downstream pressure; shut off regeneration. When burner injector is actuated, the measured pressure does not rise above ca. 1250mbar abs (expected: ca. 2400mbar).
523912	2	Burner dosing valve (DV2) downstream pressure sensor; plausibility error
523912	3	Sensor error burner dosing valve (DV2) downstream pressure sensor; signal range check high
523912	4	Sensor error burner dosing valve (DV2) downstream pressure sensor; signal range check low
523913	3	Sensor error glow plug control diagnostic line voltage; signal range check high
523913	4	Sensor error glow plug control diagnostic line voltage; signal range check low
523914	3	Glow plug control; short circuit to battery
523914	4	Glow plug control; short circuit to ground
523914	5	Glow plug control; open load
523914	5	Glow plug control release line; short circuit error
523914	11	Glow plug control; internal error
523914	12	Glow plug control; powerstage over temperature
523915	0	HCI dosing valve (DV1); overcurrent at the end of the injection phase
523915	3	HCI dosing valve (DV1); short circuit to battery
523915	3	HCI dosing valve (DV1); short circuit to battery high side
523915	4	HCI dosing valve (DV1); short circuit to ground
523915	7	HCI dosing valve (DV1); blocked closed
523915	7	HCI dosing valve (DV1); blocked open
523915	11	HCI dosing valve (DV1); short circuit high side powerstage
523915	12	HCI dosing valve (DV1); powerstage over temperature
523916	0	Physical range check high for HCI dosing valve (DV1) downstream pressure; shut off regeneration

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523916	1	Physical range check low for HCl dosing valve (DV1) downstream pressure; shut off regeneration
523916	2	Sensor HCl dosing valve (DV1) downstream pressure; plausibility error
523916	3	Sensor error HCl dosing valve (DV1) downstream pressure; signal range check high
523916	4	Sensor error HCl dosing valve (DV1) downstream pressure; signal range check low
523917	0	Physical range check high for DV1 & DV2 upstream pressure; shut off regeneration
523917	1	Physical range check low for DV1 & DV2 upstream pressure; shut off regeneration
523917	2	Sensor DV1 & DV2 upstream pressure; plausibility error
523917	3	Sensor error DV1 & DV2 upstream pressure; signal range check high
523917	4	Sensor error DV1 & DV2 upstream pressure; signal range check low
523918	0	Physical range check high for DV1 & DV2 upstream temperature; shut off regeneration
523918	1	Physical range check low for DV1 & DV2 upstream temperature; shut off regeneration
523918	2	Sensor DV1 & DV2 upstream temperature; plausibility error
523918	3	Sensor error DV1 & DV2 upstream temperature; signal range check high
523918	4	Sensor error DV1 & DV2 upstream temperature; signal range check low
523919	0	Physical range check high for airpump pressure; shut off regeneration
523919	1	Physical range check low for airpump pressure; shut off regeneration
523919	2	Sensor airpump pressure; plausibility error
523919	2	Sensor air pump airpressure; plausibility error
523919	3	Sensor error airpump pressure; signal range check high
523919	4	Sensor error airpump pressure; signal range check low
523920	0	Physical range check high for exhaustgas back pressure burner; shut off regeneration
523920	1	Physical range check low for exhaustgas back pressure burner; shut off regeneration
523920	2	Sensor exhaustgas back pressure; plausibility error
523920	2	Sensor exhaust gas back pressure burner; plausibility error
523920	3	Sensor error exhaustgas back pressure burner; signal range check high
523920	4	Sensor error exhaustgas back pressure burner; signal range check low
523921	0	Physical range check high for burner temperature
523921	1	Physical range check low for burner temperature
523921	2	Sensor burner temperature; plausibility error
523921	3	Sensor error burner temperature; signal range check high
523921	4	Sensor error burner temperature; signal range check low
523921	11	Sensor burner temperature; plausibility error
523922	3	Burner shut of valve; short circuit to battery
523922	4	Burner shut of valve; short circuit to ground
523922	4	Burner Shut Off Valve; short circuit to ground
523922	5	Burner shut off valve; open load

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523922	5	Burner Shut Off Valve; open load
523922	7	Burner Shut Off Valve; blocked closed
523922	7	Burner Shut Off Valve; blocked open
523922	12	Over temperature error on burner shut of valve
523922	12	Burner Shut Off Valve; powerstage over temperature
523929	0	Fuel Balance Control integrator injector 1 (in firing order); maximum value exceeded
523929	1	Fuel Balance Control integrator injector 1 (in firing order); minimum value exceeded
523930	0	Fuel Balance Control integrator injector 2 (in firing order); maximum value exceeded
523930	1	Fuel Balance Control integrator injector 2 (in firing order); minimum value exceeded
523931	0	Fuel Balance Control integrator injector 3 (in firing order); maximum value exceeded
523931	1	Fuel Balance Control integrator injector 3 (in firing order); minimum value exceeded
523932	0	Fuel Balance Control integrator injector 4 (in firing order); maximum value exceeded
523932	1	Fuel Balance Control integrator injector 4 (in firing order); minimum value exceeded
523933	0	Fuel Balance Control integrator injector 5 (in firing order); maximum value exceeded
523933	1	Fuel Balance Control integrator injector 5 (in firing order); minimum value exceeded
523934	0	Fuel Balance Control integrator injector 6 (in firing order); maximum value exceeded
523934	1	Fuel Balance Control integrator injector 6 (in firing order); minimum value exceeded
523935	12	Timeout Error of CAN-Transmit-Frame EEC3VOL1; Engine send messages
523936	12	Timeout Error of CAN-Transmit-Frame EEC3VOL2; Engine send messages
523938	9	Timeout Error (BAM to packet) for CAN-Receive-Frame AT1IGCVol1 information; factors & Sensorcalibration for NOX Sensor (SCR-system upstream cat; DPF-system downstream cat)
523939	9	Timeout Error (BAM to BAM) for CAN-Receive-Frame AT1IGCVol1 information; factors & Sensorcalibration for NOX Sensor (SCR-system upstream cat; DPF-system downstream cat)
523940	9	Timeout Error (PCK2PCK) for CAN-Receive-Frame AT1IGCVol1 information; factors & Sensorcalibration for NOX Sensor (SCR-system upstream cat; DPF-system downstream cat)
523941	9	Timeout Error (BAM to packet) for CAN-Receive-Frame AT1OGCVol2 information; factors & Sensorcalibration for NOX Sensor (SCR-system downstream cat; DPF-system downstream cat)
523942	9	Timeout Error (BAM to BAM) for CAN-Receive-Frame AT1OGCVol2 information; factors & Sensorcalibration for NOX Sensor (SCR-system downstream cat; DPF-system downstream cat)
523943	9	Timeout Error (PCK2PCK) for CAN-Receive-Frame AT1OGCVol2 information; factors & Sensorcalibration for NOX Sensor (SCR-system downstream cat; DPF-system downstream cat)
523946	0	Zerofuel calibration injector 1 (in firing order); maximum value exceeded
523946	1	Zerofuel calibration injector 1 (in firing order); minimum value exceeded
523947	0	Zerofuel calibration injector 2 (in firing order); maximum value exceeded
523947	1	Zerofuel calibration injector 2 (in firing order); minimum value exceeded
523948	0	Zerofuel calibration injector 3 (in firing order); maximum value exceeded
523948	1	Zerofuel calibration injector 3 (in firing order); minimum value exceeded

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523949	0	Zerofuel calibration injector 4 (in firing order); maximum value exceeded
523949	1	Zerofuel calibration injector 4 (in firing order); minimum value exceeded
523950	0	Zerofuel calibration injector 5 (in firing order); maximum value exceeded
523950	1	Zerofuel calibration injector 5 (in firing order); minimum value exceeded
523951	0	Zerofuel calibration injector 6 (in firing order); maximum value exceeded
523951	1	Zerofuel calibration injector 6 (in firing order); minimum value exceeded
523960	0	Physical range check high for EGR cooler downstream temperature
523960	0	High exhaust gas temperature EGR cooler downstream; warning threshold exceeded
523960	1	Physical range check low for EGR cooler downstream temperature
523960	1	High exhaust gas temperature EGR cooler downstream; shut off threshold exceeded
523973	14	SCR Tamper detection; derating timer below limit 1
523974	14	SCR Tamper detection; derating timer below limit 2
523975	14	Urea quality; derating timer below limit 1
523976	14	Urea quality; derating timer below limit 2
523977	14	Urea tank level; derating timer below limit 1
523978	14	Urea tank level; derating timer below limit 2
523980	14	Bad quality of reduction agent detected
523981	11	Urea-tank without heating function (heating phase)
523982	0	Powerstage diagnosis disabled; high battery voltage
523982	1	Powerstage diagnosis disabled; low battery voltage
523988	3	Charging lamp; short circuit to battery
523988	4	Charging lamp; short circuit to ground
523988	5	Charging lamp; open load
523988	12	Charging lamp; over temperature
523989	0	Fuel Balance Control integrator injector 7 (in firing order); maximum value exceeded
523989	1	Fuel Balance Control integrator injector 7 (in firing order); minimum value exceeded
523990	0	Fuel Balance Control integrator injector 8 (in firing order); maximum value exceeded
523990	1	Fuel Balance Control integrator injector 8 (in firing order); minimum value exceeded
523992	9	Timeout Error of CAN-Receive-Frame DM19Vol1; NOX sensor upstream
523993	9	Timeout Error of CAN-Receive-Frame DM19Vol2; NOX sensor downstream
523995	13	check of missing injector adjustment value programming (IMA) injector 7 (in firing order)
523996	13	check of missing injector adjustment value programming (IMA) injector 8 (in firing order)
523998	4	Injector cylinder bank 2 slave; short circuit
523999	12	Injector powerstage output Slave defect
524000	3	Injector 7 (in firing order); short circuit
524000	4	High side to low side short circuit in the injector 7 (in firing order)

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524000	5	Injector 7 (in firing order); interruption of electric connection
524001	3	Injector 8 (in firing order); short circuit
524001	4	High side to low side short circuit in the injector 8 (in firing order)
524001	5	Injector 8 (in firing order); interruption of electric connection
524004	12	Too many recognized misfires in cylinder 7 (in firing order)
524005	12	Too many recognized misfires in cylinder 8 (in firing order)
524011	0	Zerofuel calibration injector 7 (in firing order); maximum value exceeded
524011	1	Zerofuel calibration injector 7 (in firing order); minimum value exceeded
524012	0	Zerofuel calibration injector 8 (in firing order); maximum value exceeded
524012	1	Zerofuel calibration injector 8 (in firing order); minimum value exceeded
524013	7	Burner flame unintentional deleted
524013	7	Burner operation is interrupted too often
524014	1	Air pressure glow plug flush line; below limit
524016	2	Amount of air is not plausible to pump speed
524016	2	Calculated amount of air is not plausible to HFM reading
524016	11	HFM sensor; electrical fault
524017	12	Spark plug control unit (SPCU); electrical fault
524017	12	Spark plug control unit (SPCU); internal error
524018	14	DPF wasn't regenerated, power reduction phase 1 (manuell regeneration request)
524019	11	Air Pump; air lines blocked
524020	14	Engine power; Not enough oxygen for regeneration
524021	11	Burner fuel line pipe leak behind Shut Off Valve
524022	14	DPF wasn't regenerated, power reduction phase 2 (manuell regeneration request)
524023	14	DPF wasn't regenerated, warning condition (manuell regeneration mode)
524024	11	Deviation of the exhaust gas temperature setpoint to actual value downstream (DOC) too high
524025	5	DPF system; operating voltage error
524025	14	Particulate filter; regeneration not succesful
524028	2	CAN message PROEGRActr; plausibility error
524029	2	Timeout Error of CAN-Receive-Frame ComEGRActr -exhaust gas recirculation positioner
524030	7	EGR actuator; internal error
524031	13	EGR actuator; calibration error
524032	2	EGR actuator; status message "EGRCust" is missing
524033	7	EGR actuator; due to overload in Save Mode
524034	3	Disc separator; short circuit to battery
524034	4	Disc separator; short circuit to ground
524034	5	Disc Separator; open load

FAULT CODES

524034	12	Disc Separator; powerstage over temperature
524035	12	Injector diagnostics; time out error in the SPI communication
524036	12	Injector diagnostics Slave; time out error in the SPI communication
524037	3	Ashlamp; short circuit to battery
524037	4	Ashlamp; short circuit to ground
524037	5	Ashlamp; open load
524038	9	Timeout error of CAN-Receive-Frame ComMS_Sys1TO (error memory Slave); Master-Slave internal CAN message
524039	9	Timeout error of CAN-Receive-Frame ComMS_Sys2TO (error memory Slave); Master-Slave internal CAN message
524040	9	Timeout error of CAN-Receive-Frame ComMS_Sys3TO (error memory Slave); Master-Slave internal CAN message
524041	9	Timeout error of CAN-Receive-Frame ComMS_Sys4TO (error memory Slave); Master-Slave internal CAN message
524042	9	Timeout error of CAN-Receive-Frame ComMS_Sys5TO (error memory Slave); Master-Slave internal CAN message
524043	9	Timeout error of CAN-Receive-Frame ComMS_Sys6TO (error memory Slave); Master-Slave internal CAN message
524044	9	CAN message ComMS_Sys7 not received from slave
524045	9	Master-Slave CAN; Message-Counter-Error of CAN-Receive-Frame ComMSMoFOvR
524046	9	Master-Slave CAN; Checksum-Error of CAN-Receive-Frame ComMSMoFOvR
524047	9	Master-Slave CAN; Message-Length-Error of CAN-Receive-Frame ComMSMoFOvR
524048	9	Timeout error CAN message ComMSMoFOvR1TO error memory Slave
524049	9	Message copy error in the Master / Slave data transfer
524052	11	Error memory Slave reports FID MSMonFC2; Shut-Off Path test error of fuel injection system
524052	11	Error memory Slave reports FID MSMonFC3; timeout of engine state messages (ComMS_Sys1-7) from master ECU
524052	11	Master ECU and Slave ECU data sets or software are not identical
524055	4	Spark Plug Control Unit (SPCU); short circuit to ground
524057	2	Electric fuel pump; fuel pressure build up error
524062	12	Regeneration inhibit switch not available; ComInhSwtNA
524062	12	Regeneration release switch not available; ComRegSwtNA
524068	2	Master ECU and Slave ECU have been identified as the same types
524069	9	Timeout Error of CAN-Receive-Frame MSMon_FidFCCTO; Master-Slave CAN communication faulty
524097	9	Timeout error of CAN-Transmit-Frame DPFBnAirPmpCtl
524098	9	Timeout error of CAN-Transmit-Frame ComDPFBnPT

FAULT CODES

524099	9	Timeout error of CAN-Transmit-Frame ComDPFC1
524100	9	Timeout error of CAN-Transmit-Frame ComDPFHisDat
524101	9	Timeout error of CAN-Transmit-Frame ComDPFTstMon
524102	9	Timeout error of CAN-Receive-Frame ComRxDPFBrnAirPmpCtl
524103	9	Timeout error of CAN-Receive-Frame ComRxDPFBrnAirPmp
524104	9	Timeout error of CAN-Receive-Frame ComRxDPFCtl
524105	9	Timeout error of CAN-Transmit-Frame ComEGRMsFlw
524106	9	Timeout error of CAN-Receive-Frame ComRxEGRMsFlw1
524107	9	Timeout error of CAN-Receive-Frame ComRxEGRMsFlw2
524108	9	Timeout error of CAN-Transmit-Frame ComEGRTVActr
524109	9	Timeout error of CAN-Receive-Frame ComRxEGRTVActr
524110	9	Timeout error of CAN-Transmit-Frame ComETVActr
524111	9	Timeout error of CAN-Receive-Frame ComRxETVActr
524112	9	Timeout ComITVActr
524113	9	Timeout error of CAN-Receive-Frame ComRxITVActr
524114	9	Timeout error of CAN-Transmit-Frame A1DOC
524115	9	Timeout error of CAN-Transmit-Frame AT1S
524116	9	Timeout error of CAN-Transmit-Frame SCR2
524117	9	Timeout error of CAN-Transmit-Frame SCR3
524118	9	Timeout error of CAN-Receive-Frame ComRxCM1
524119	9	Timeout error of CAN-Receive-Frame ComRxCustSCR3
524120	9	Timeout error of CAN-Receive-Frame ComRxSCRHtDiag
524121	9	Timeout error of CAN-Receive-Frame ComRxTrbChActr
524122	9	Timeout error of CAN-Receive-Frame ComRxUQSens
524123	9	Timeout error of CAN-Receive-Frame ComSCRHtCtl
524124	9	Timeout error of CAN-Receive-Frame ComTxAT1IMG
524125	9	Timeout error of CAN-Receive-Frame ComTxTrbChActr

FAULT CODES

How to Troubleshoot the Perkins 1204E-E44TA Engine

Troubleshooting procedures and additional engine information is available in the Perkins 1204E-E44TA Troubleshooting Manual (Perkins part number KENR9116-01).

Perkins 1204E-E44TA Troubleshooting Manual

Genie part number	57.4700.1400
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Schematics



Observe and Obey:

- ☑ Troubleshooting and repair procedures shall be completed by a person trained and qualified on the repair of this machine.
- ☑ Immediately tag and remove from service a damaged or malfunctioning machine.
- ☑ Repair any machine damage or malfunction before operating the machine.

Before Troubleshooting:

- ☑ Read, understand and obey the safety rules and operating instructions in the appropriate operator's manual on your machine.
- ☑ Be sure that all necessary tools and test equipment are available and ready for use.

About This Section

There are two groups of schematics in this section. An illustration legend precedes each group of drawings.

Electrical Schematics



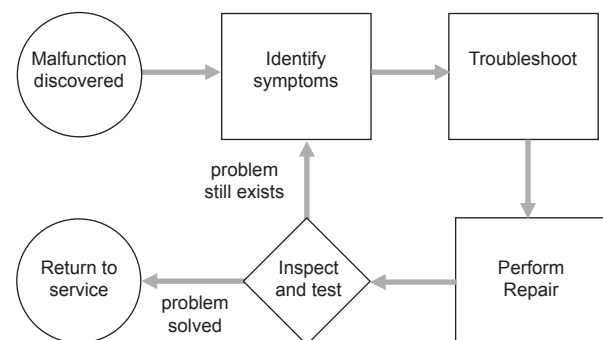
WARNING Electrocution/burn hazard. Contact with electrically charged circuits could result in death or serious injury. Remove all rings, watches and other jewelry.

Hydraulic Schematics



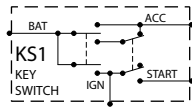
WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

General Repair Process

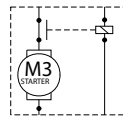


Electrical and Hydraulic Symbols Legend

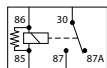
Electrical Schematic Symbols



Key switch



Engine start



Control relay



Alternator



Fuse



Circuit breaker



Horn or Alarm



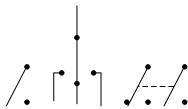
Light



Valve coil



Valve coil with diode



Switch



Diode



Proximity switch



Limit switch



Temperature switch



Fuel level sender



Battery



Pressure switch

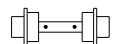
Hydraulic Schematic Symbols



Pressure switch



Hydraulic cylinder



Axle



Orifice



Adjustable orifice



Filter



Check valve



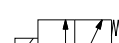
Flow regulator



Relief valve



3 position 4 way solenoid valve



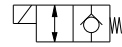
2 position 3 way directional valve



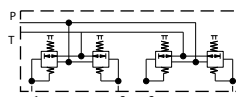
3 position 4 way proportional directional valve



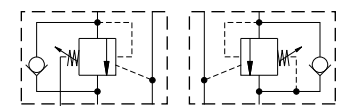
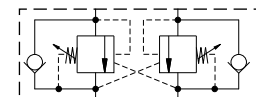
2 position 4 way solenoid valve



2 position 2 way solenoid valve



Joystick

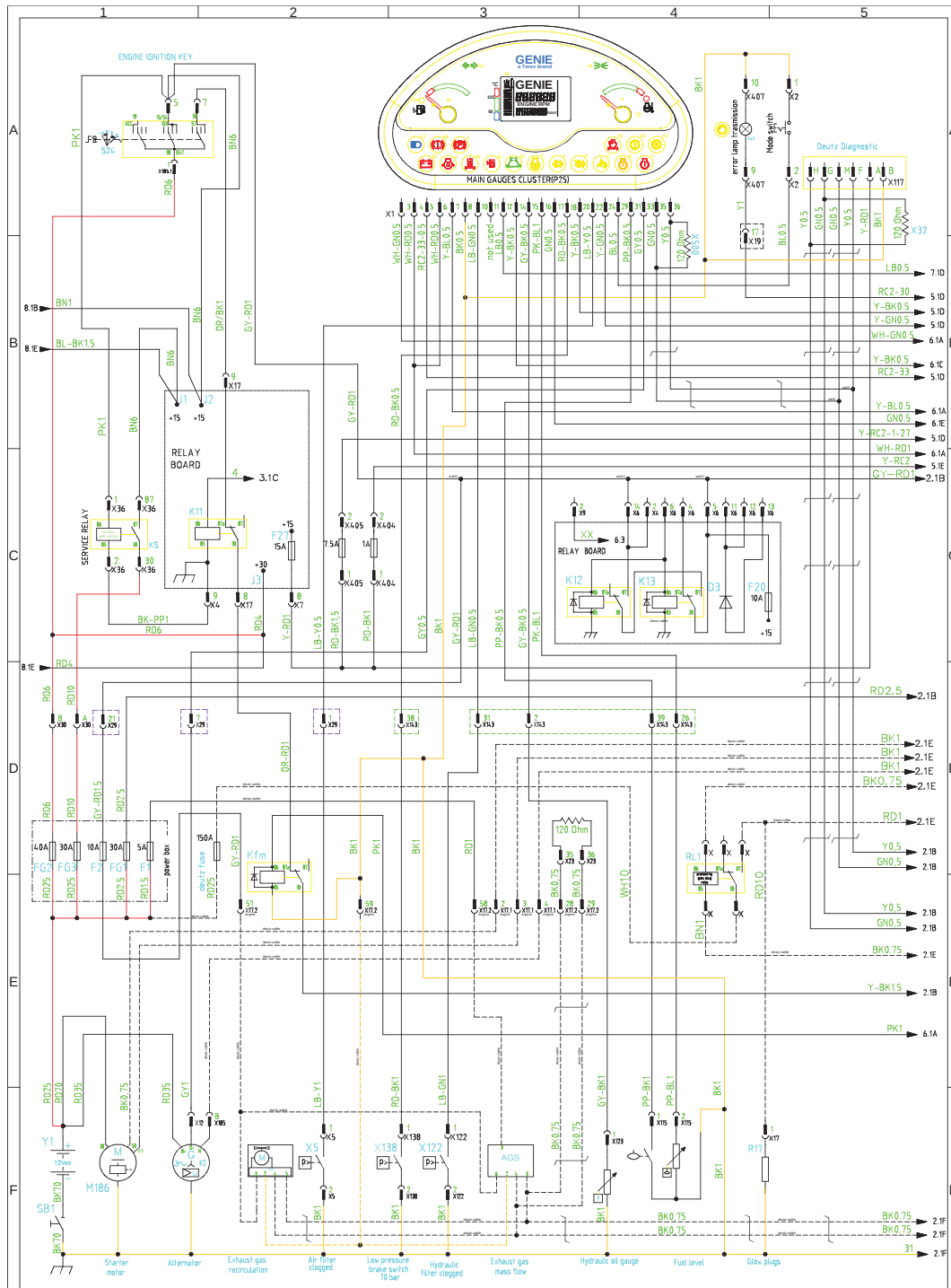


Counterbalance valve

Electrical Schematic - Deutz

Up to SN GTH1513 B-5

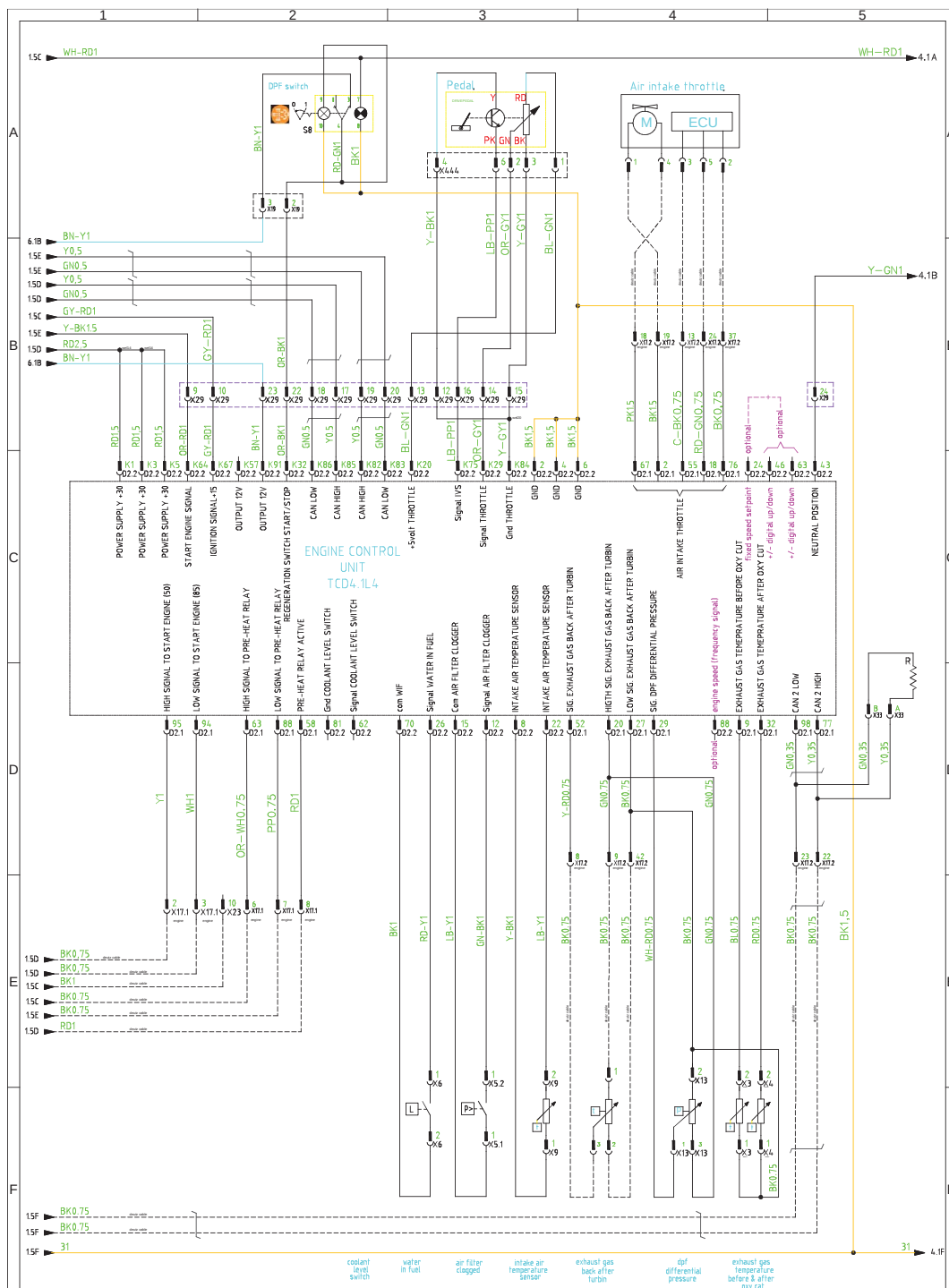
Sheet 1 of 8



ELECTRICAL SCHEMATIC - DEUTZ

Up to SN GTH1513 B-5

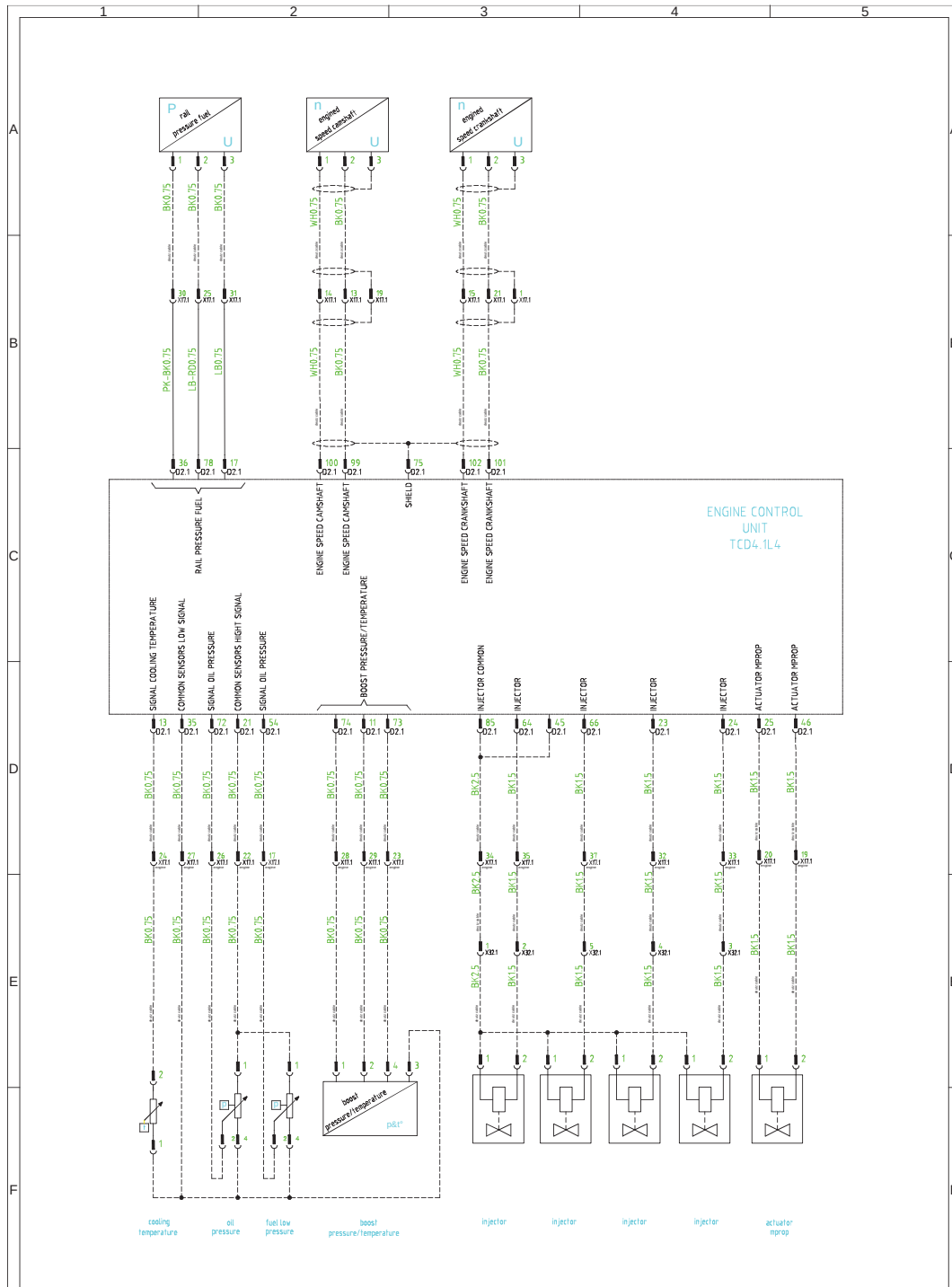
Sheet 2 of 8



ELECTRICAL SCHEMATIC - DEUTZ

Up to SN GTH1513 B-5

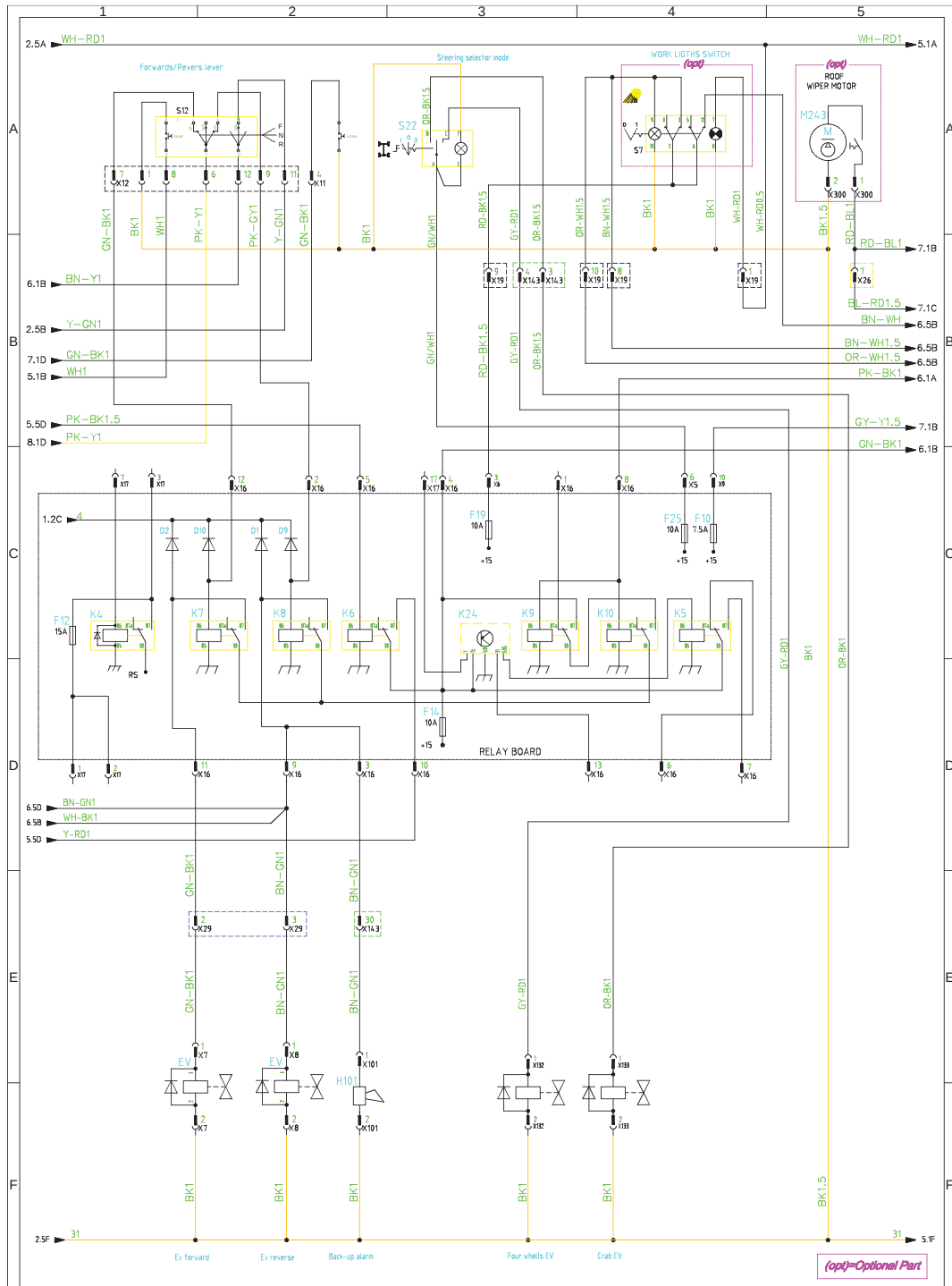
Sheet 3 of 8



ELECTRICAL SCHEMATIC - DEUTZ

Up to SN GTH1513 B-5

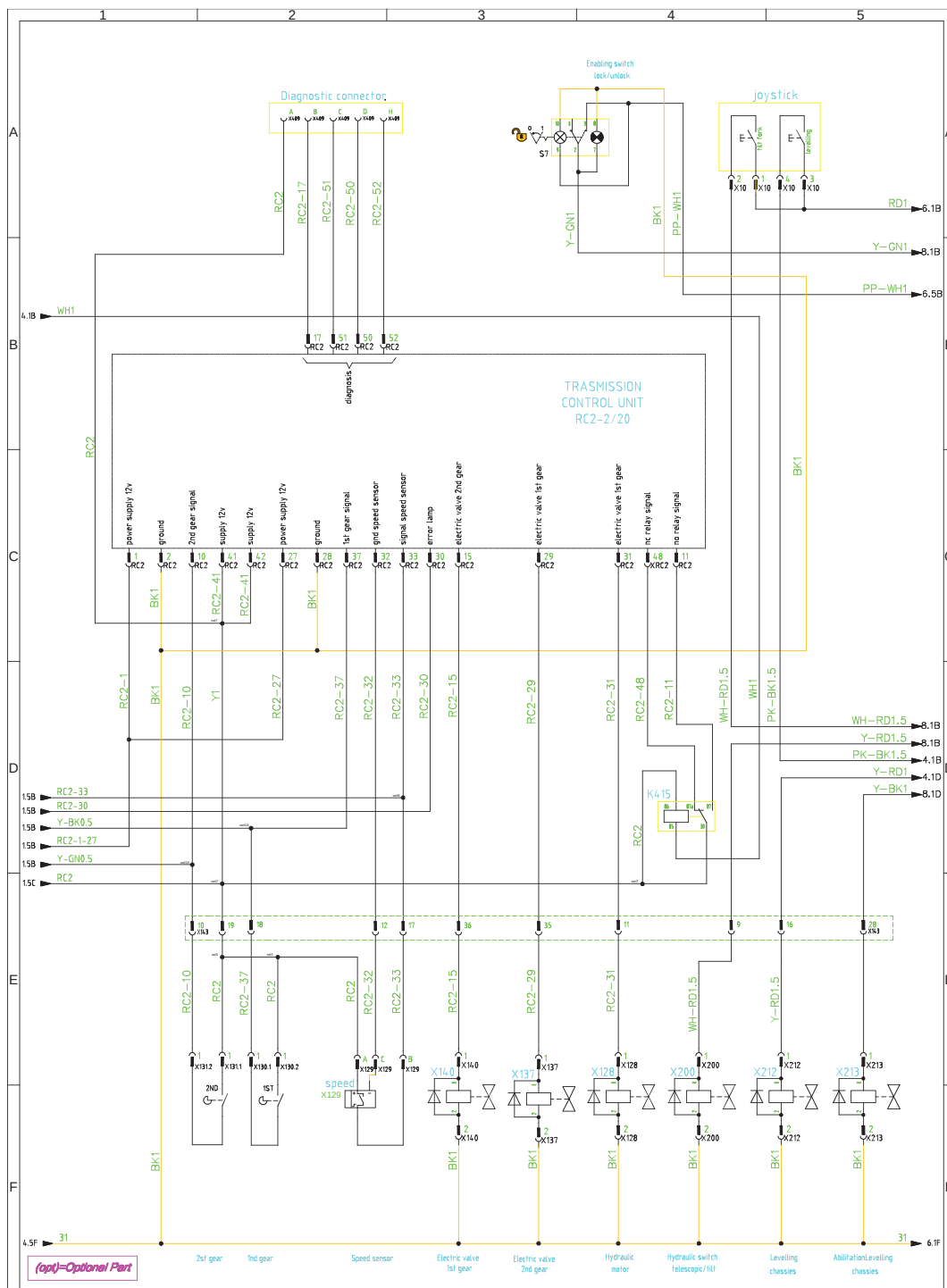
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ELECTRICAL SCHEMATIC - DEUTZ

Up to SN GTH1513 B-5

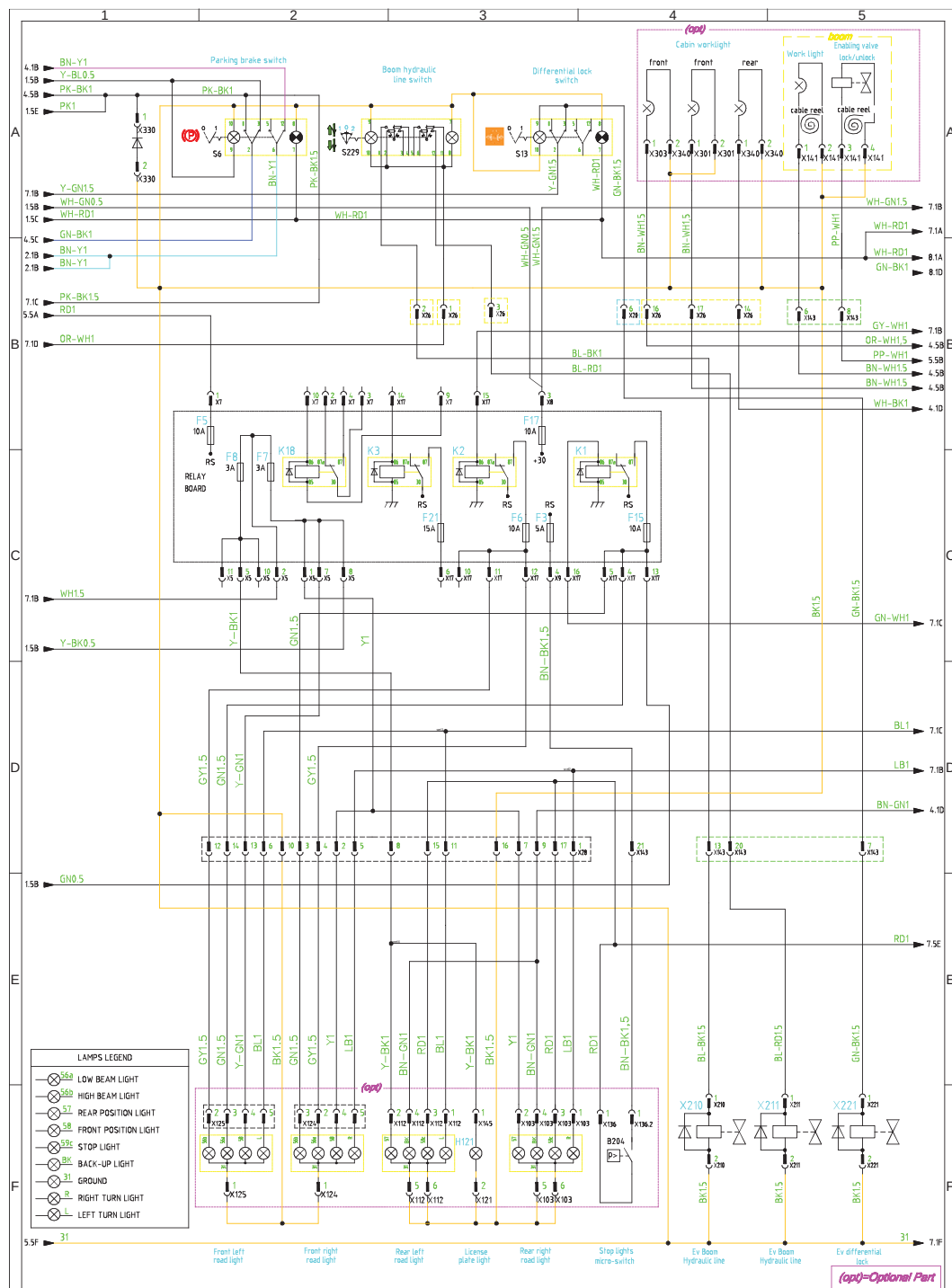
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ELECTRICAL SCHEMATIC - DEUTZ

Up to SN GTH1513 B-5

Sheet 6 of 8



Up to SN GTH1513 B-5 Sheet 7 of 8

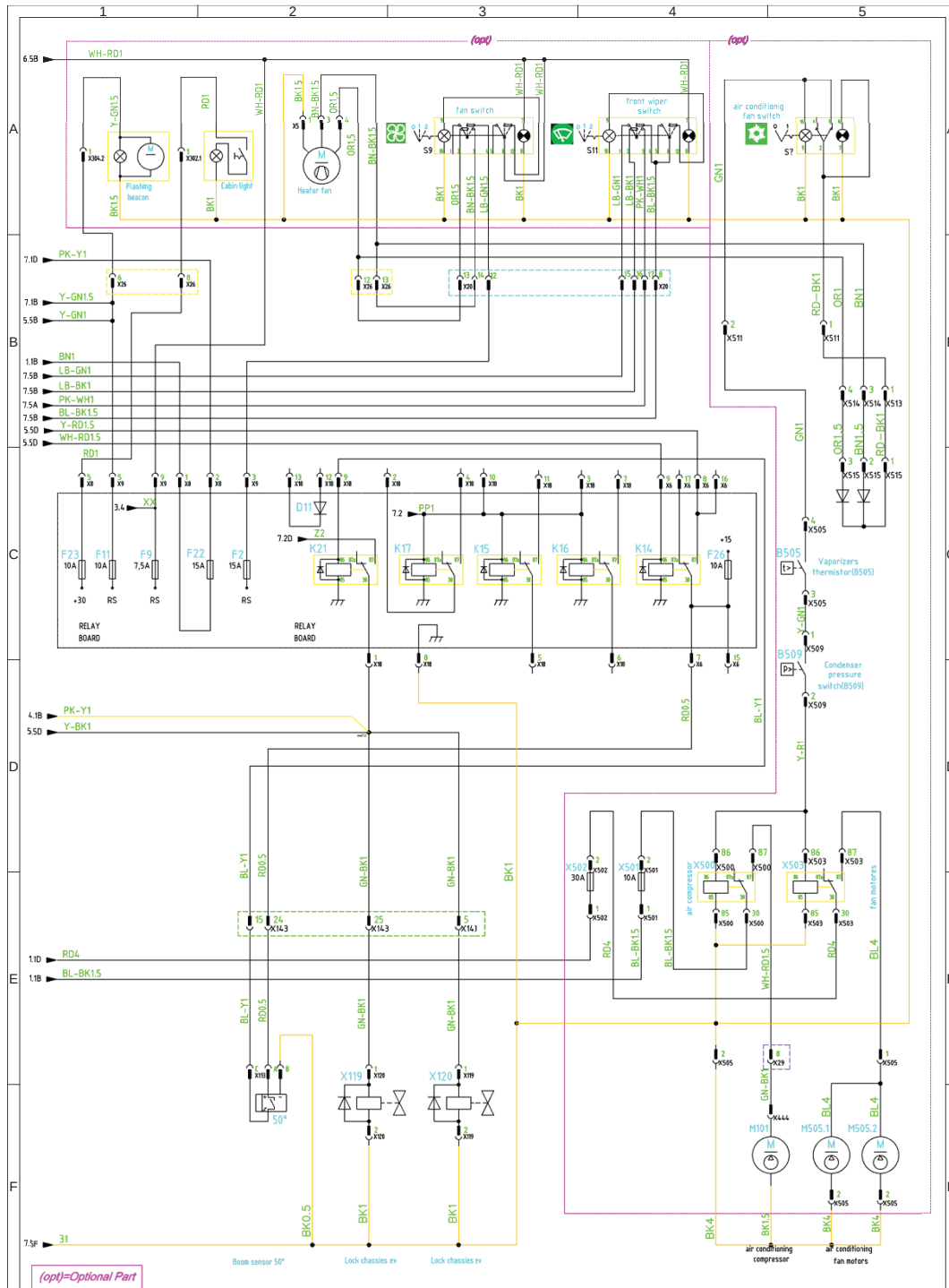
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ELECTRICAL SCHEMATIC - DEUTZ

Up to SN GTH1513 B-5

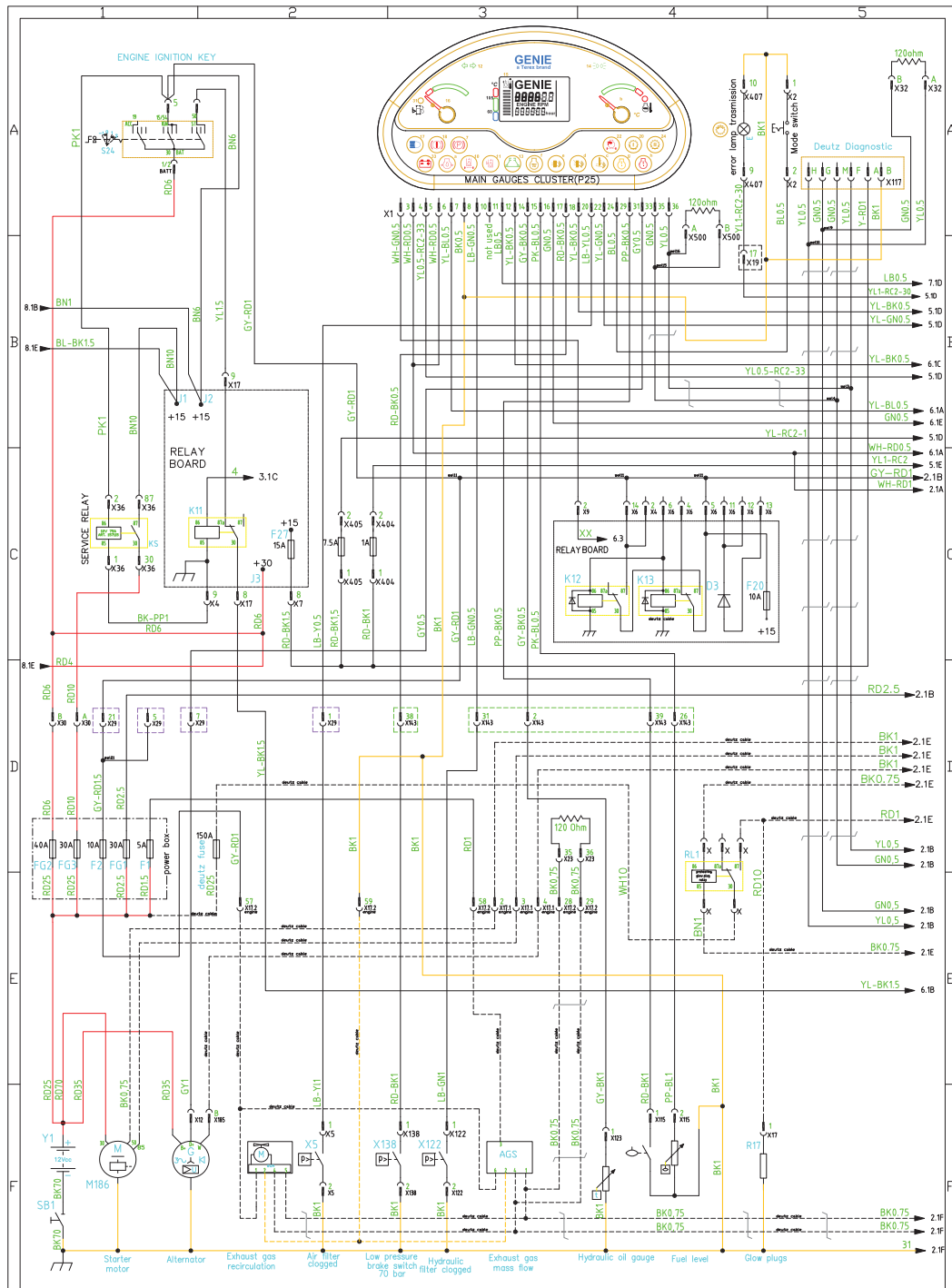
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ELECTRICAL SCHEMATIC - DEUTZ

From SN GTH1513 B-6

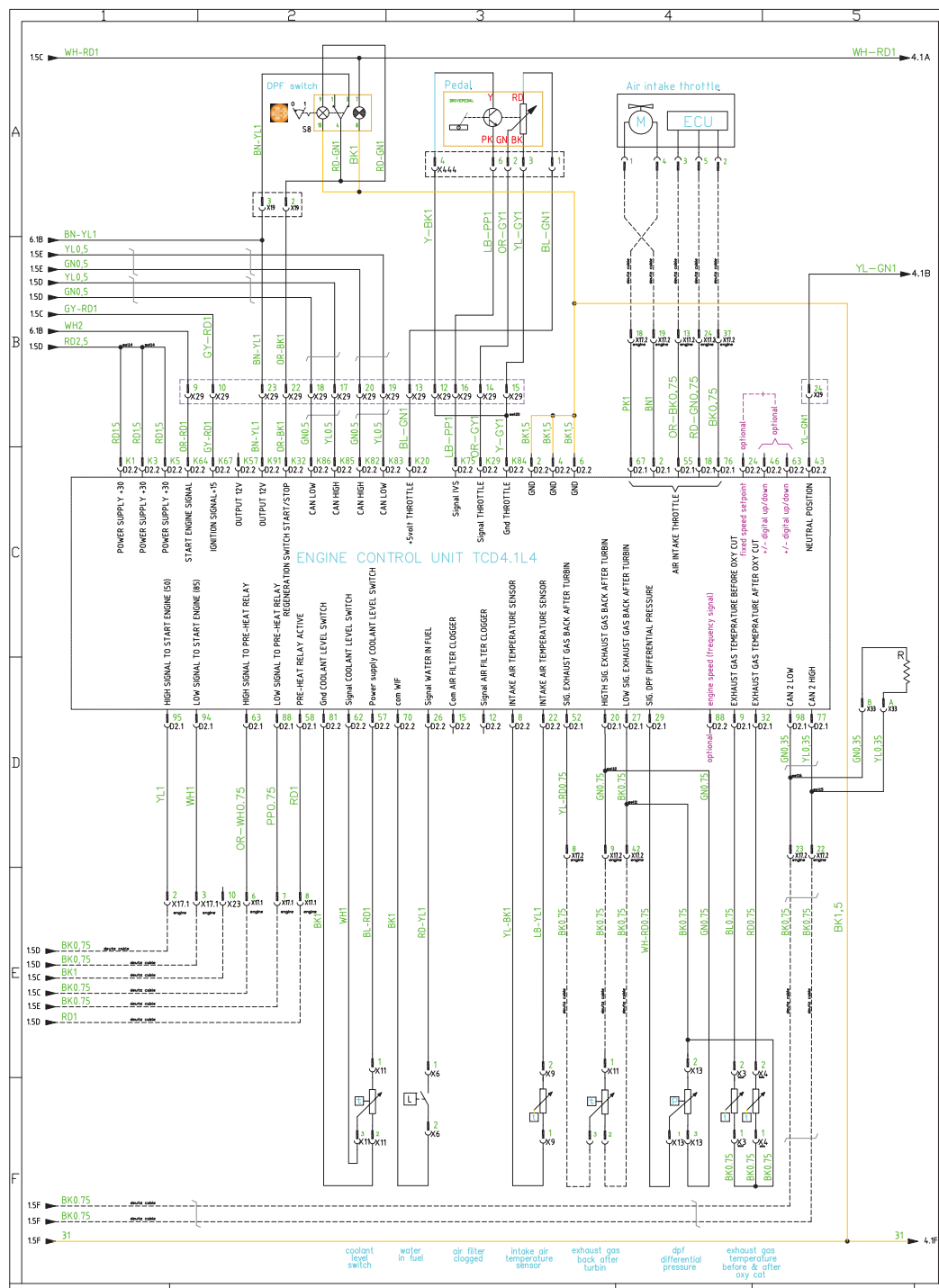
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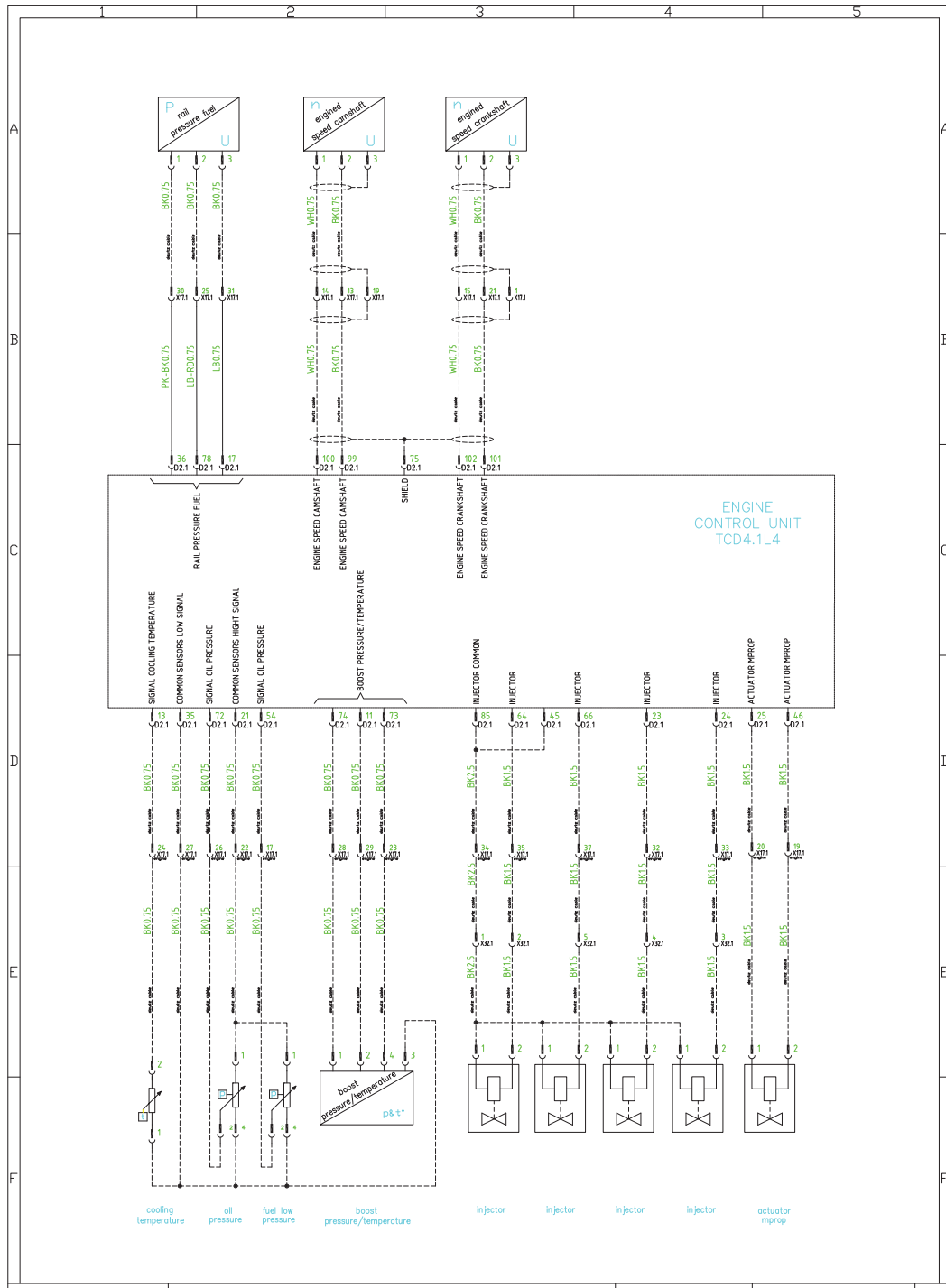
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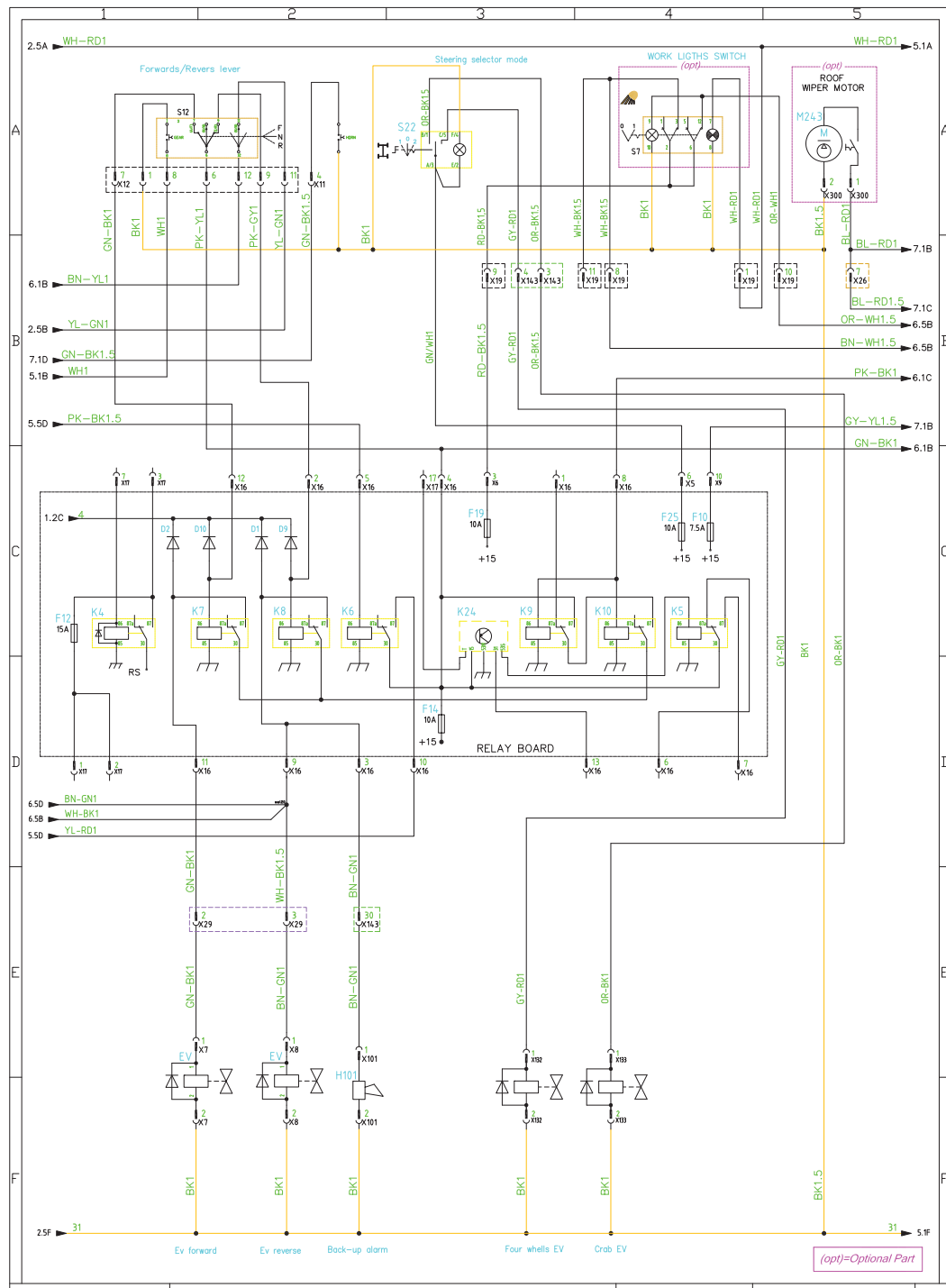
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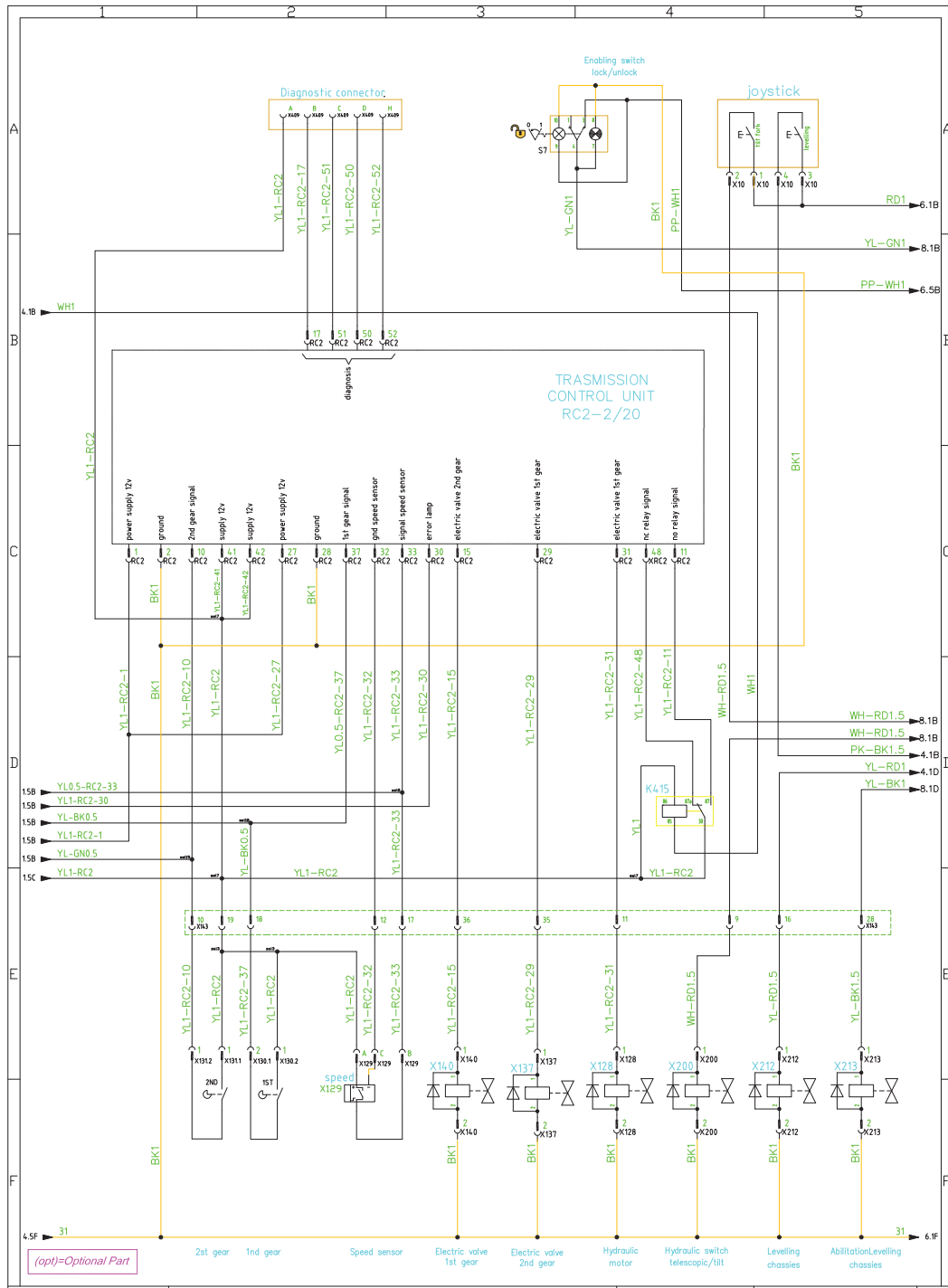
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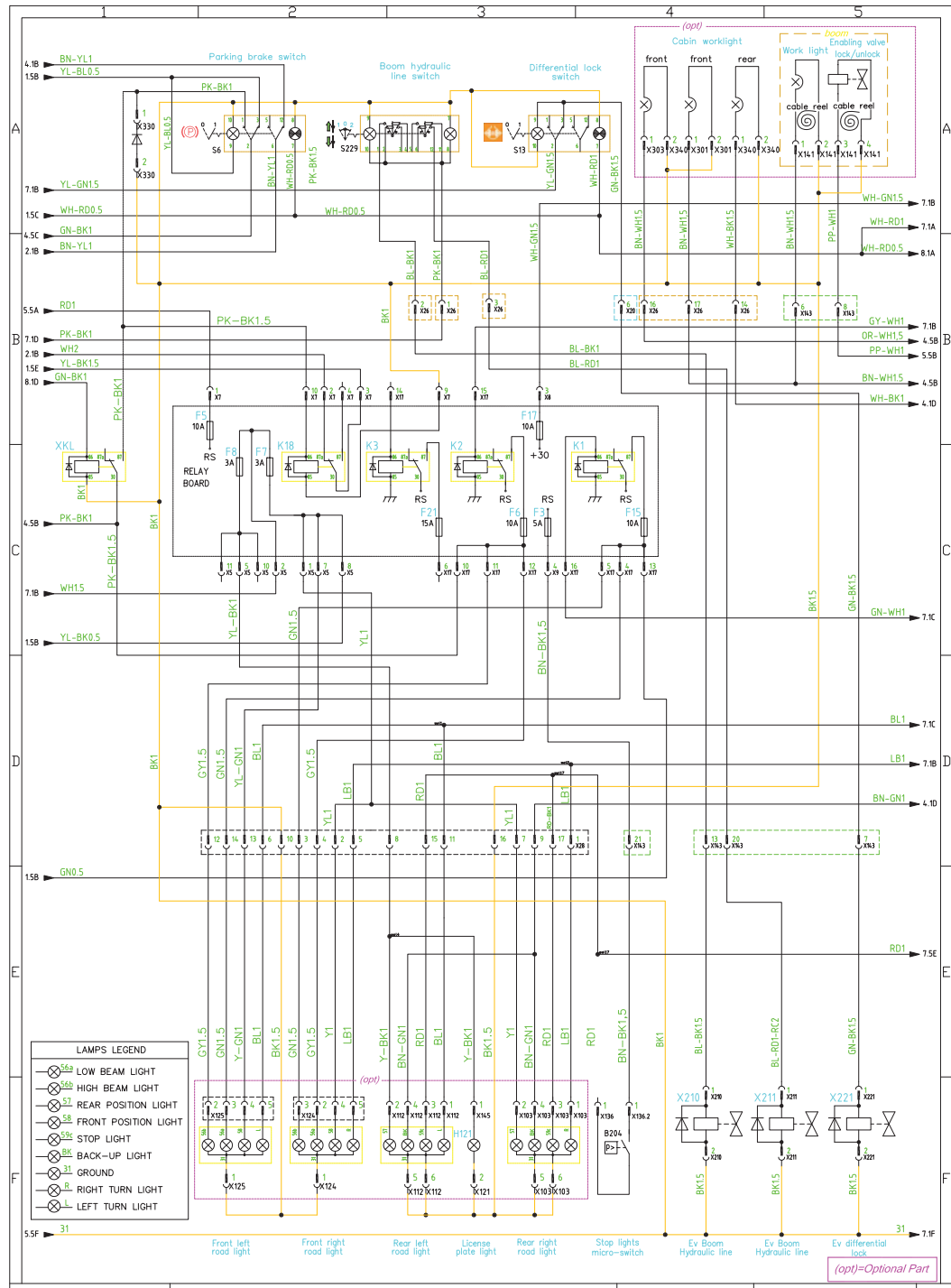
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ELECTRICAL SCHEMATIC - DEUTZ

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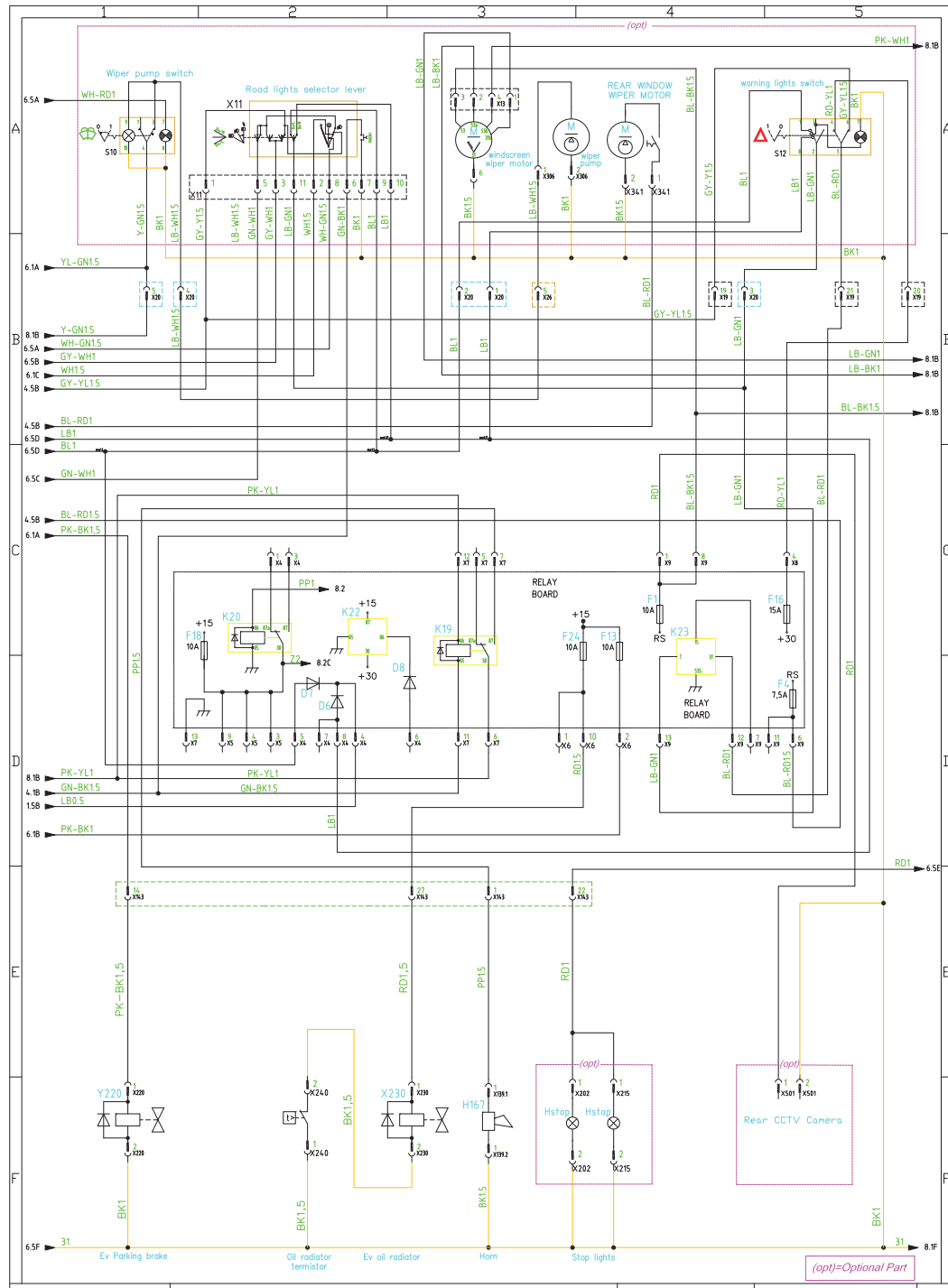
Sheet 6 of 8



ELECTRICAL SCHEMATIC - DEUTZ

From SN GTH1513 B-6

Sheet 7 of 8



FROM OUR COLLECTIONS

FROM OUR CHIEF OF POLICE



Up to SN GTH1513 B-5 Sheet 1 of 7

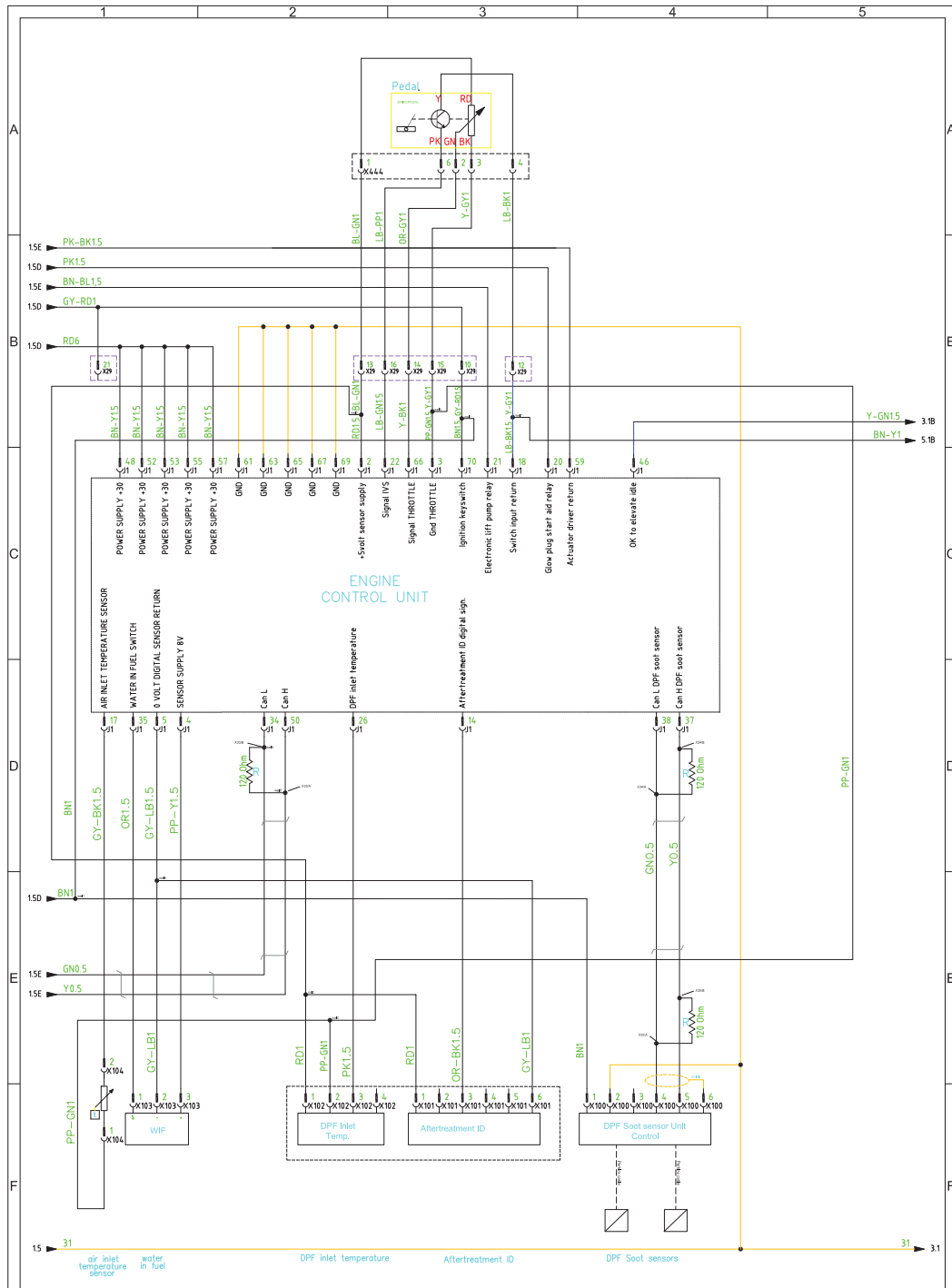
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ELECTRICAL SCHEMATIC - PERKINS

Up to SN GTH1513 B-5

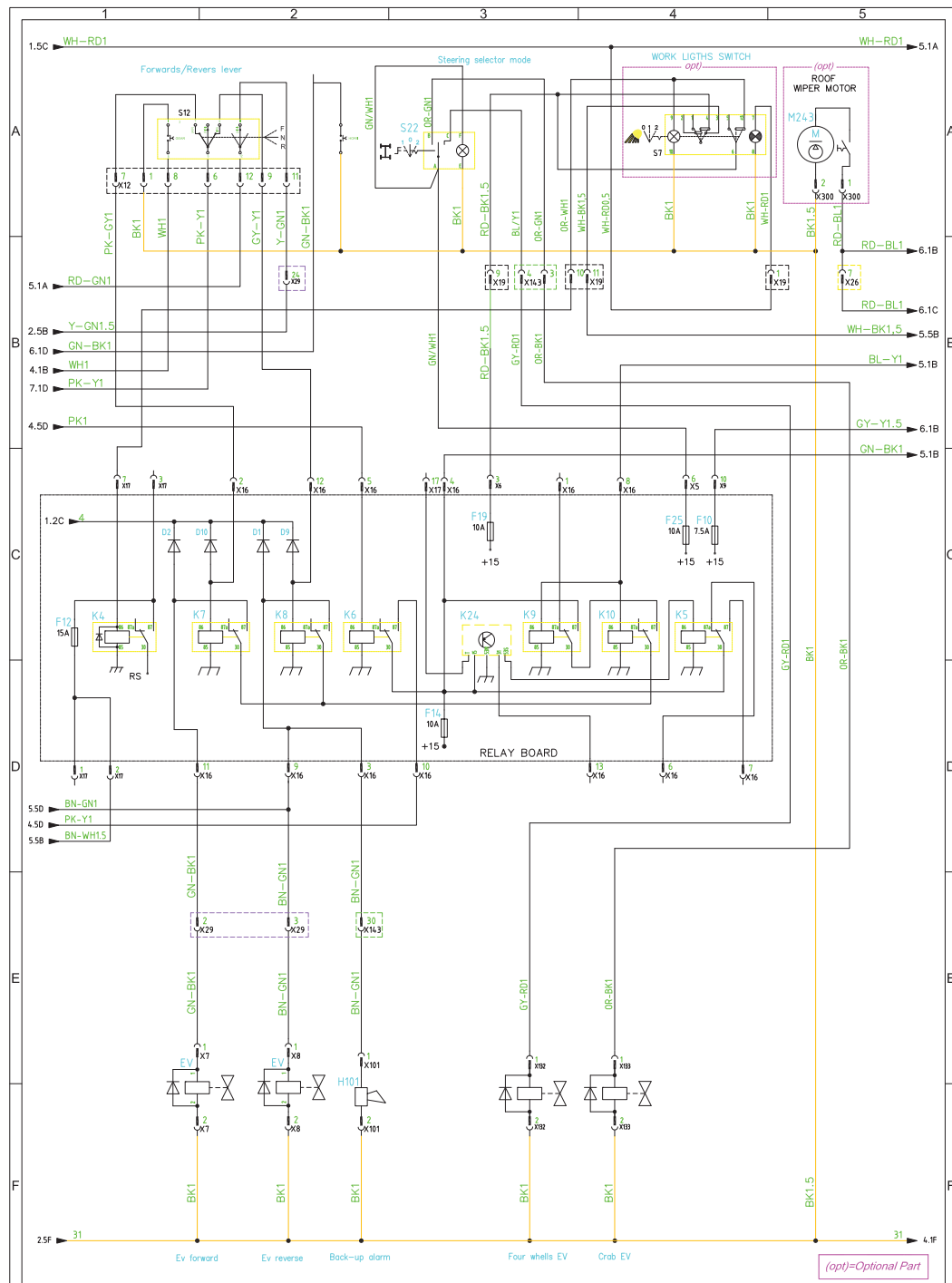
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ELECTRICAL SCHEMATIC - PERKINS

Up to SN GTH1513 B-5

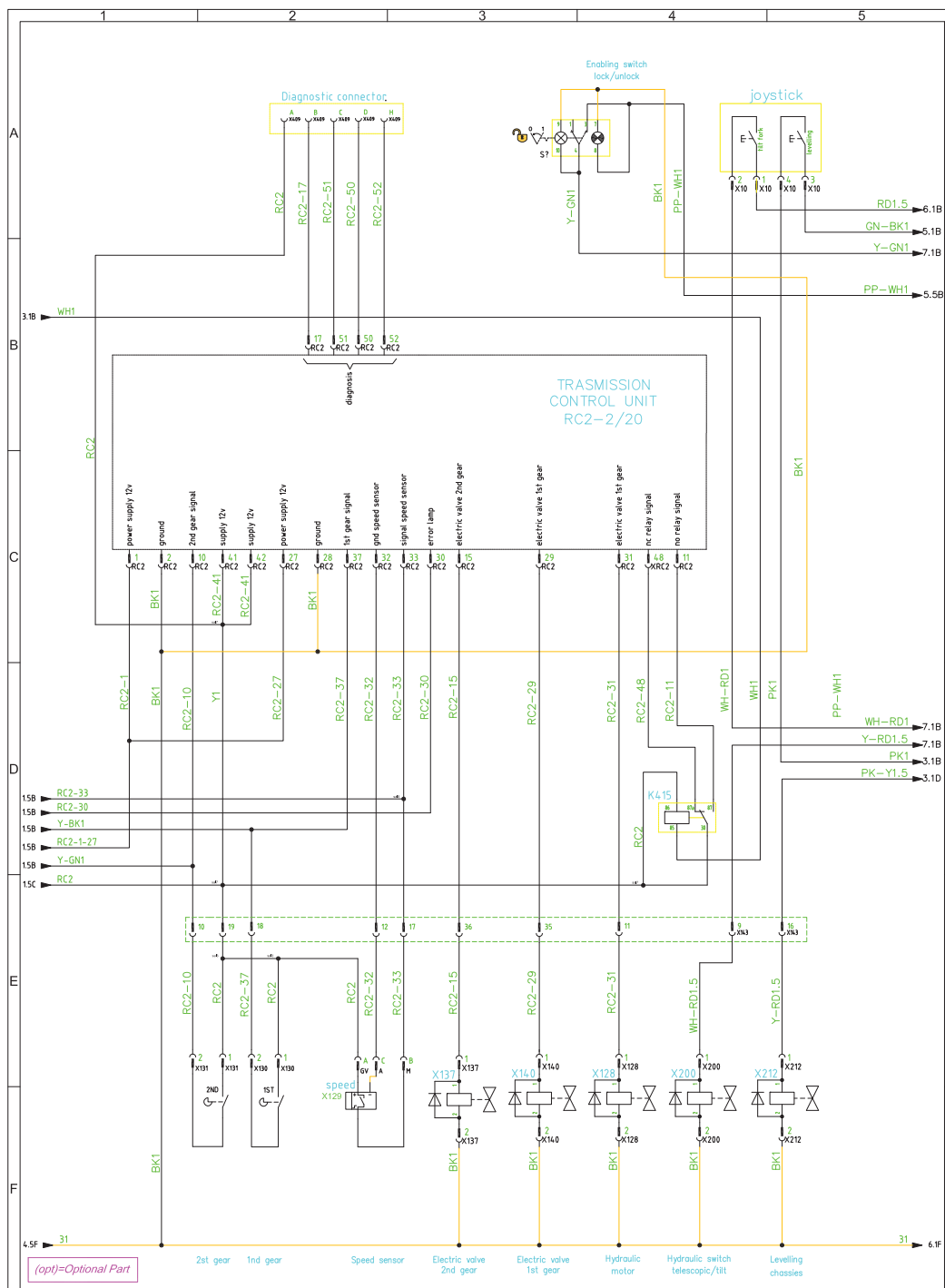
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Up to SN GTH1513 B-5

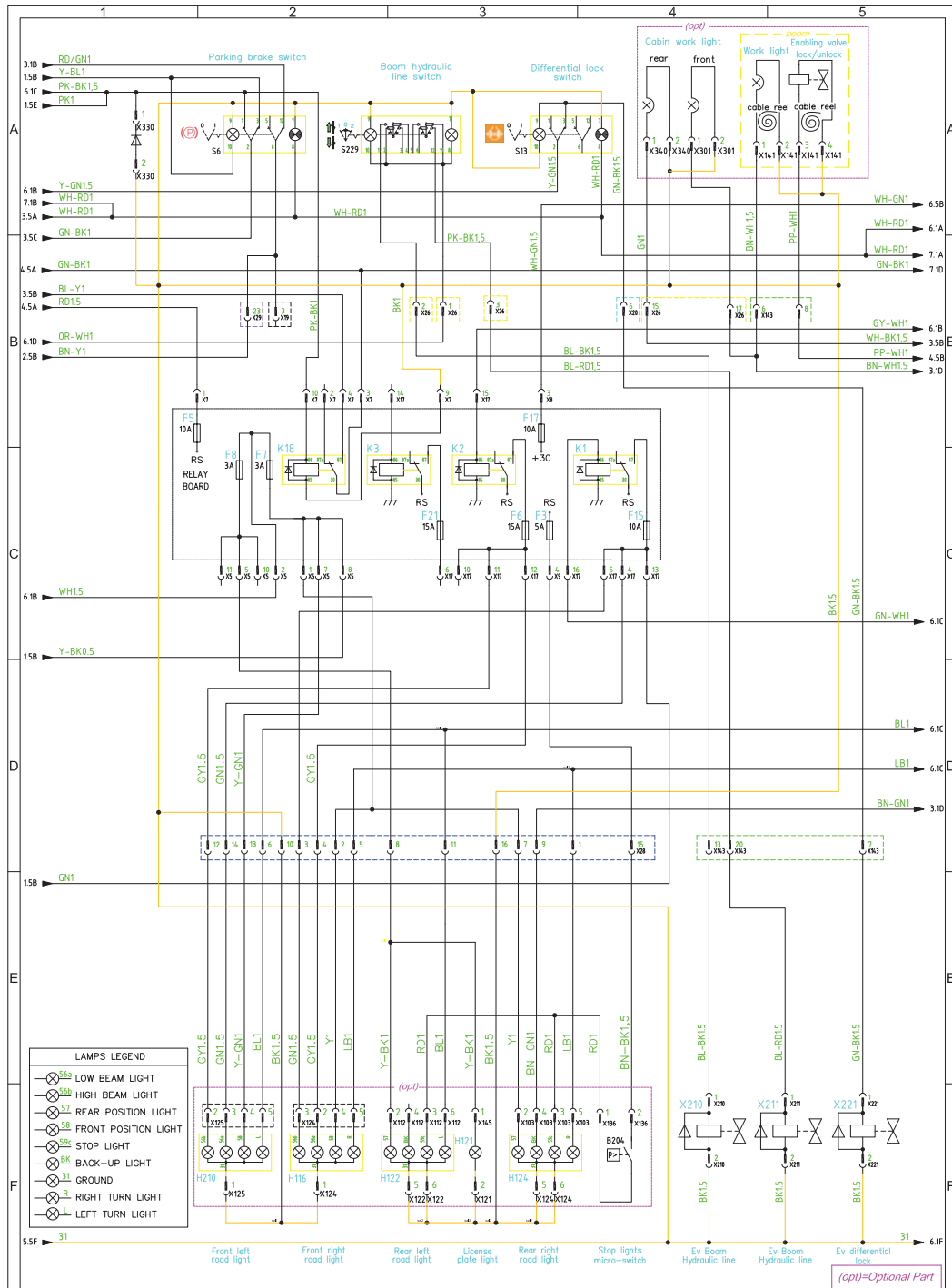
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ELECTRICAL SCHEMATIC - PERKINS

Up to SN GTH1513 B-5

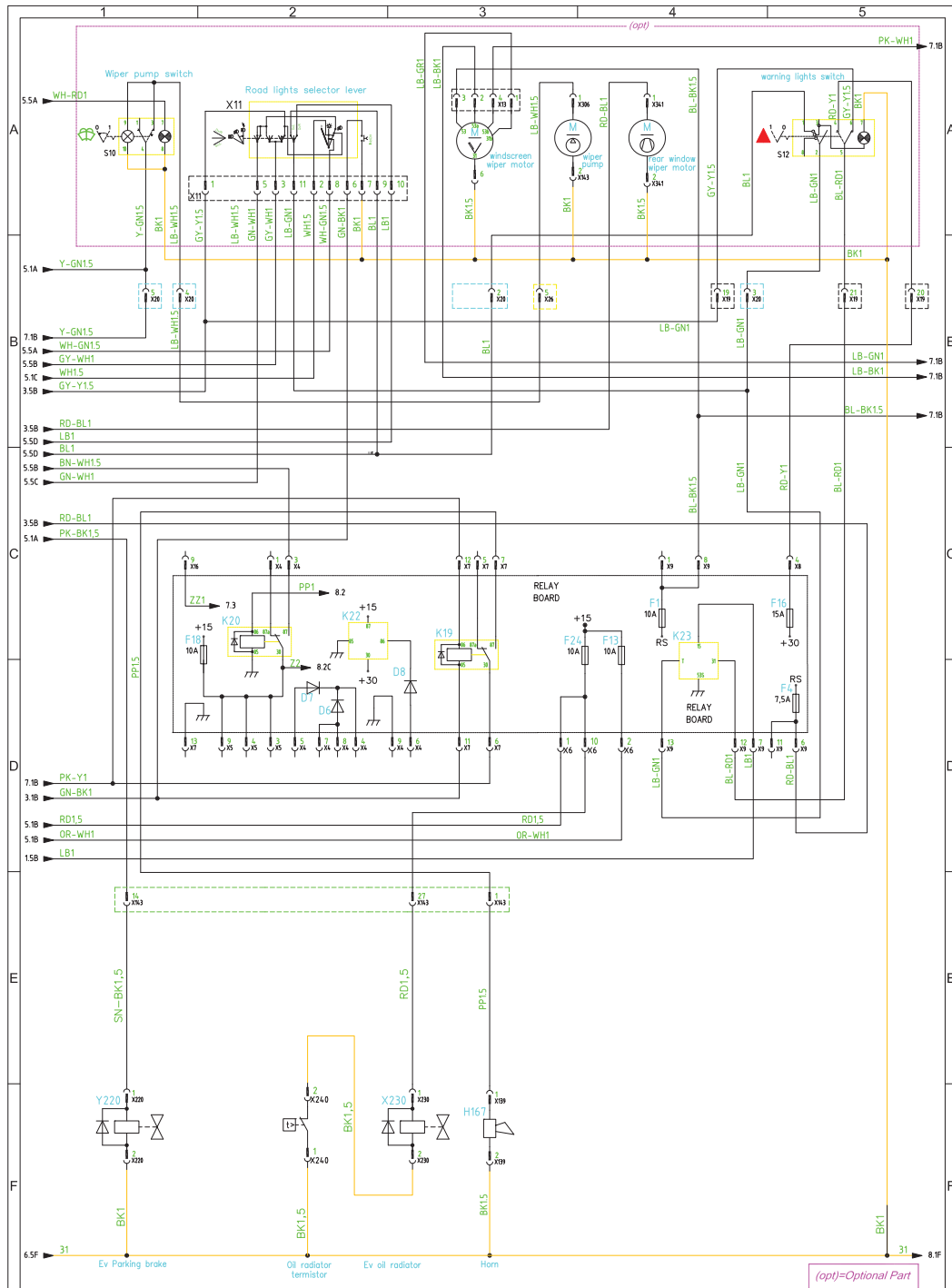
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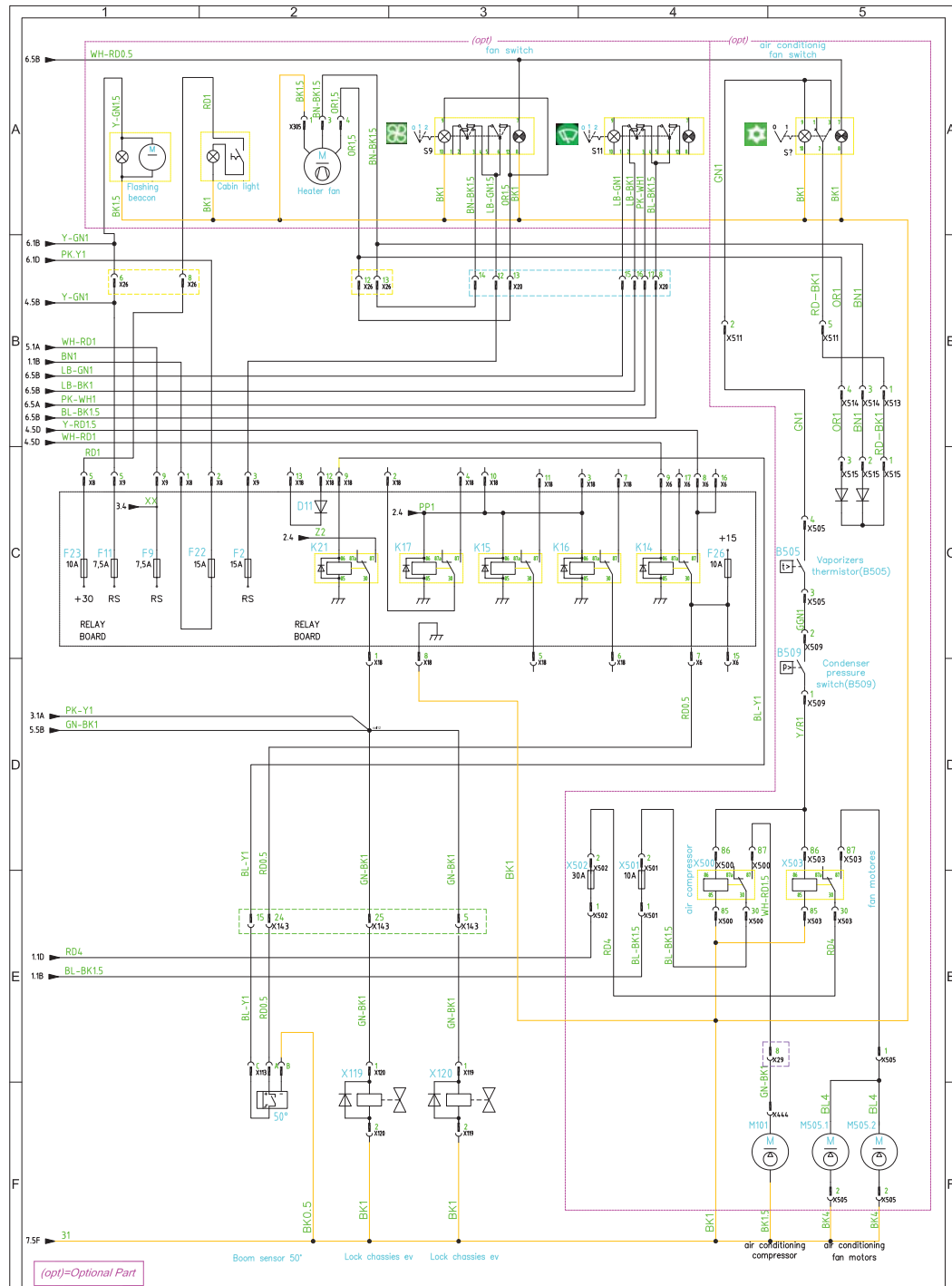
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ELECTRICAL SCHEMATIC - PERKINS

Up to SN GTH1513 B-5

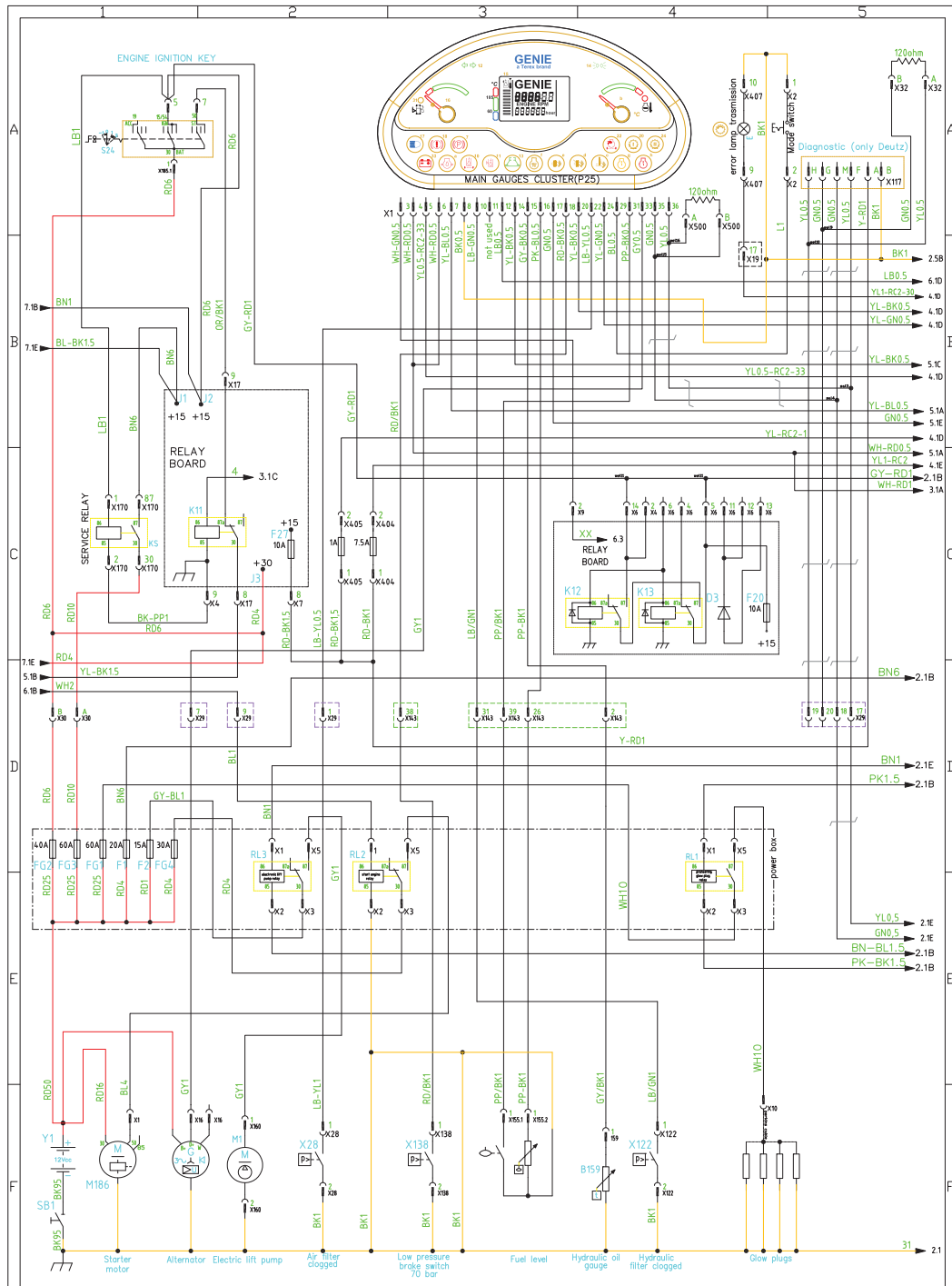
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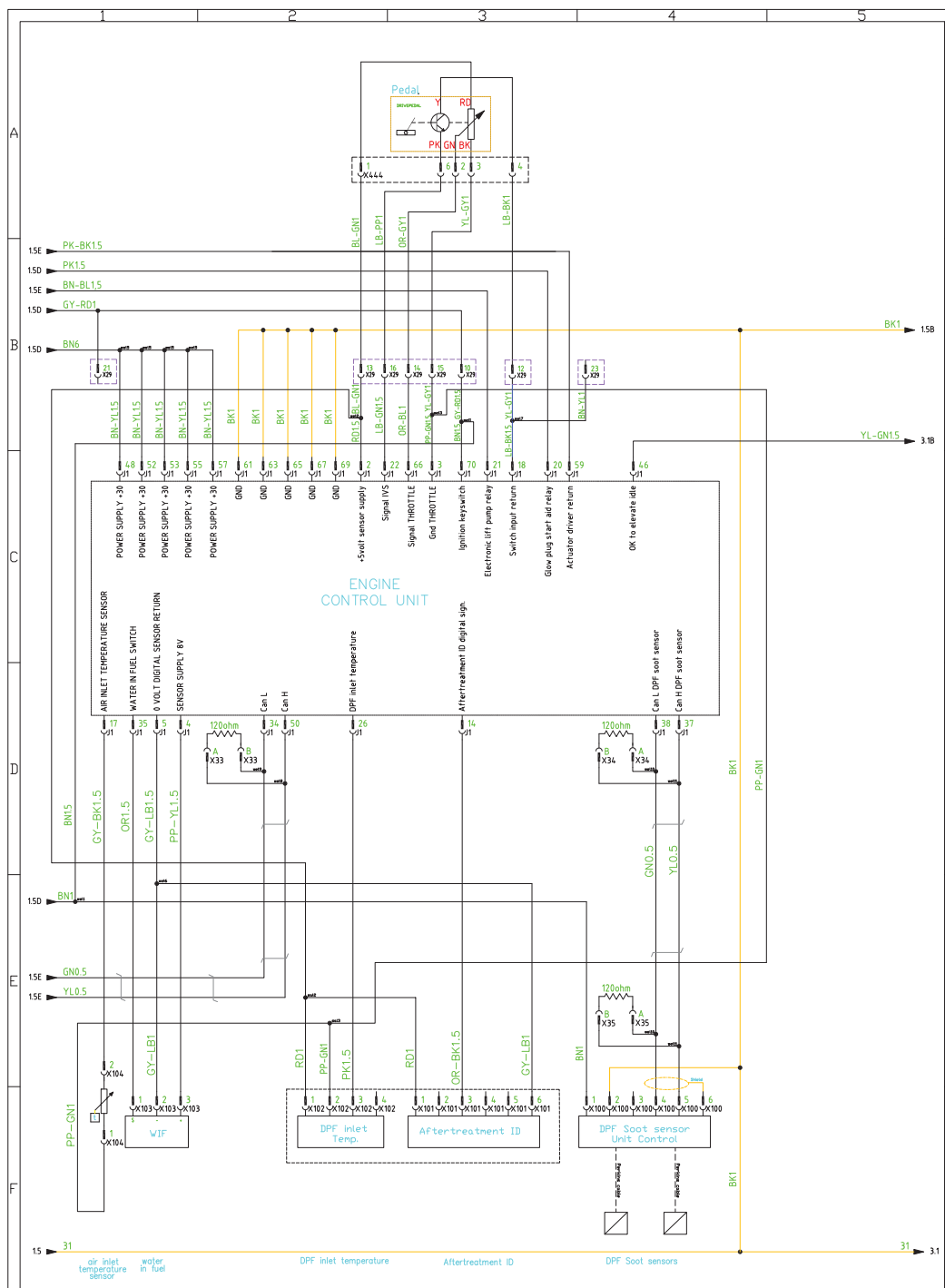
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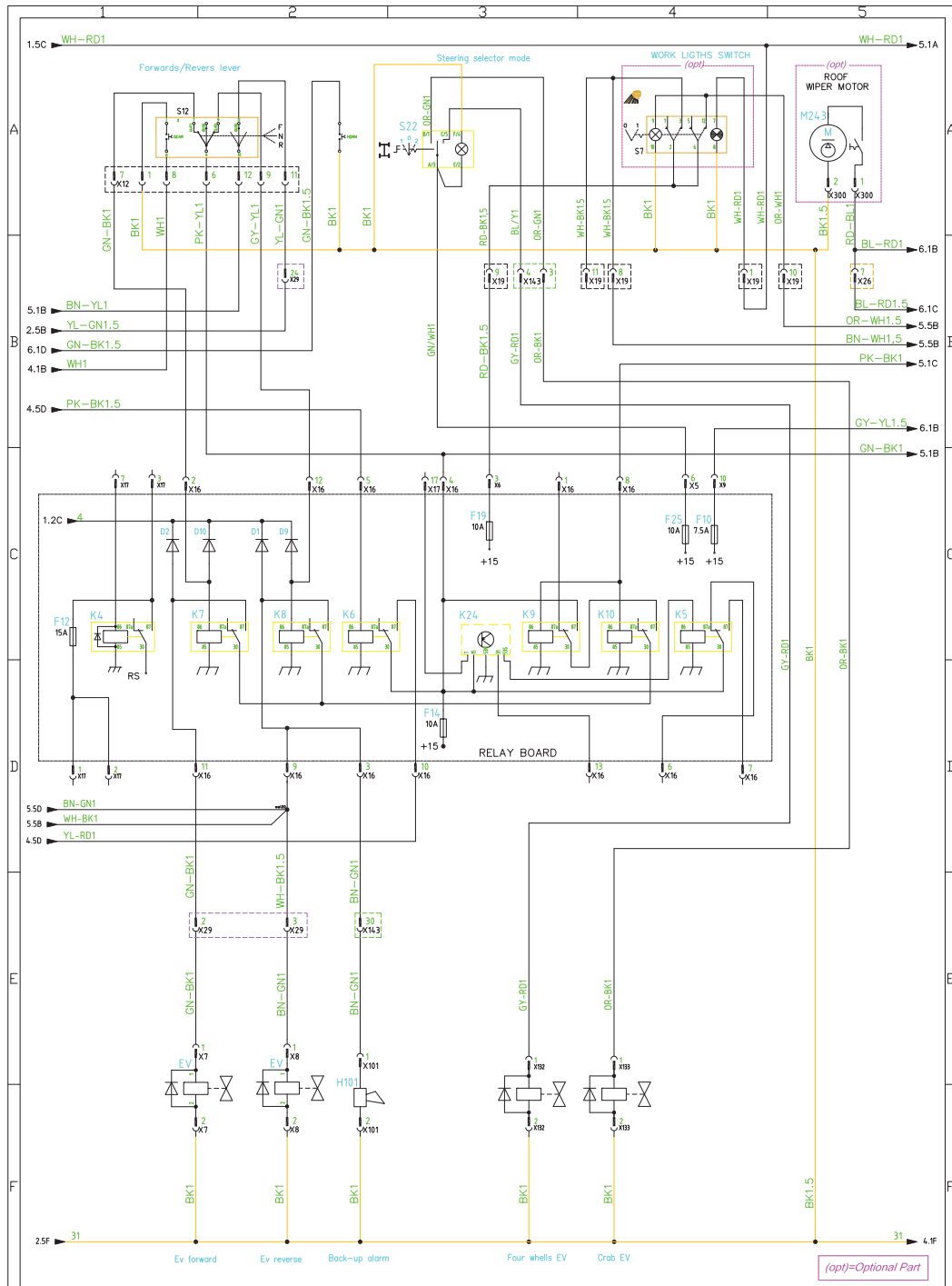
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ELECTRICAL SCHEMATIC - PERKINS

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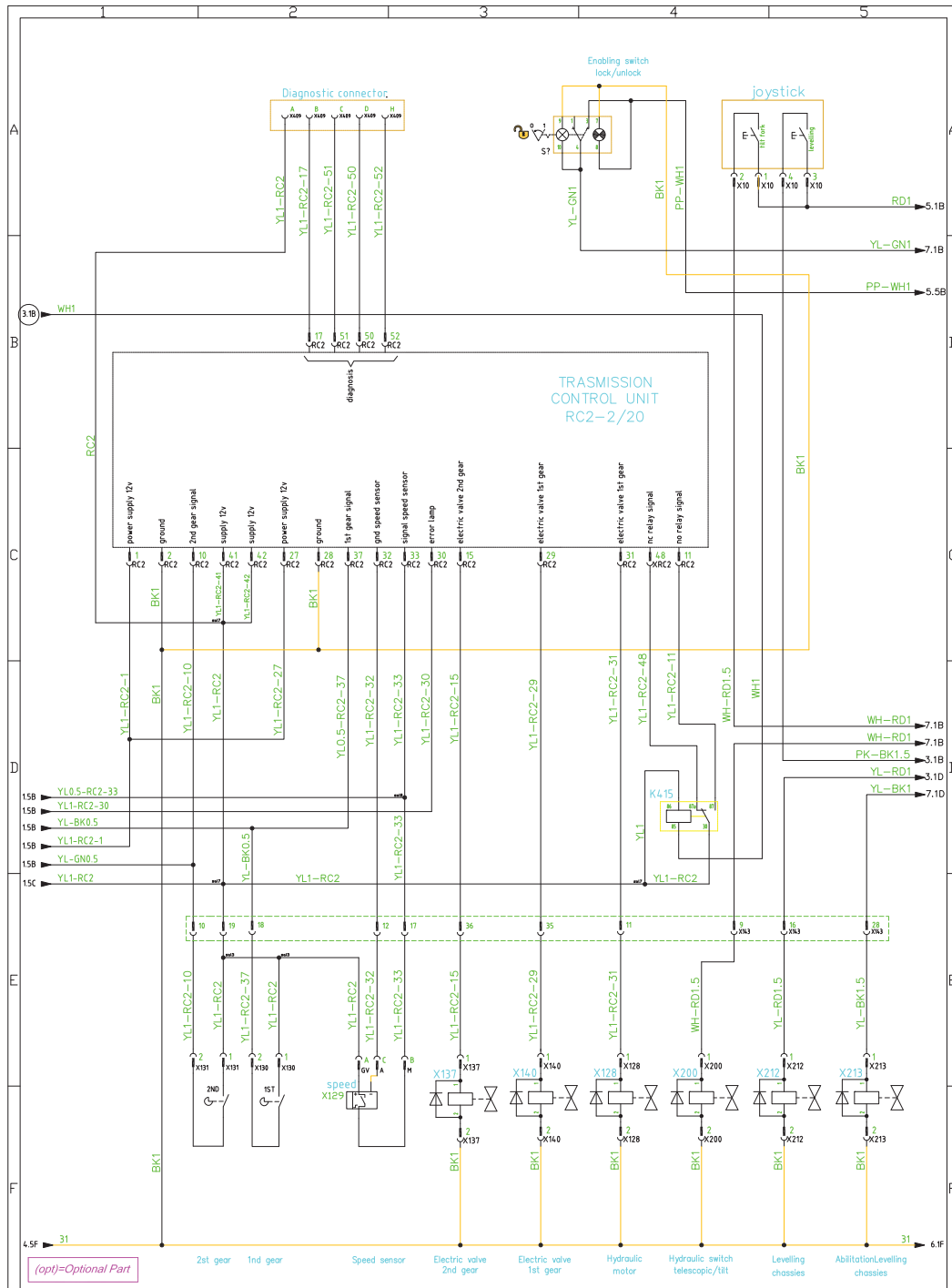
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ELECTRICAL SCHEMATIC - PERKINS

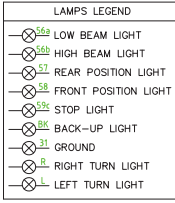
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Sheet 4 of 7



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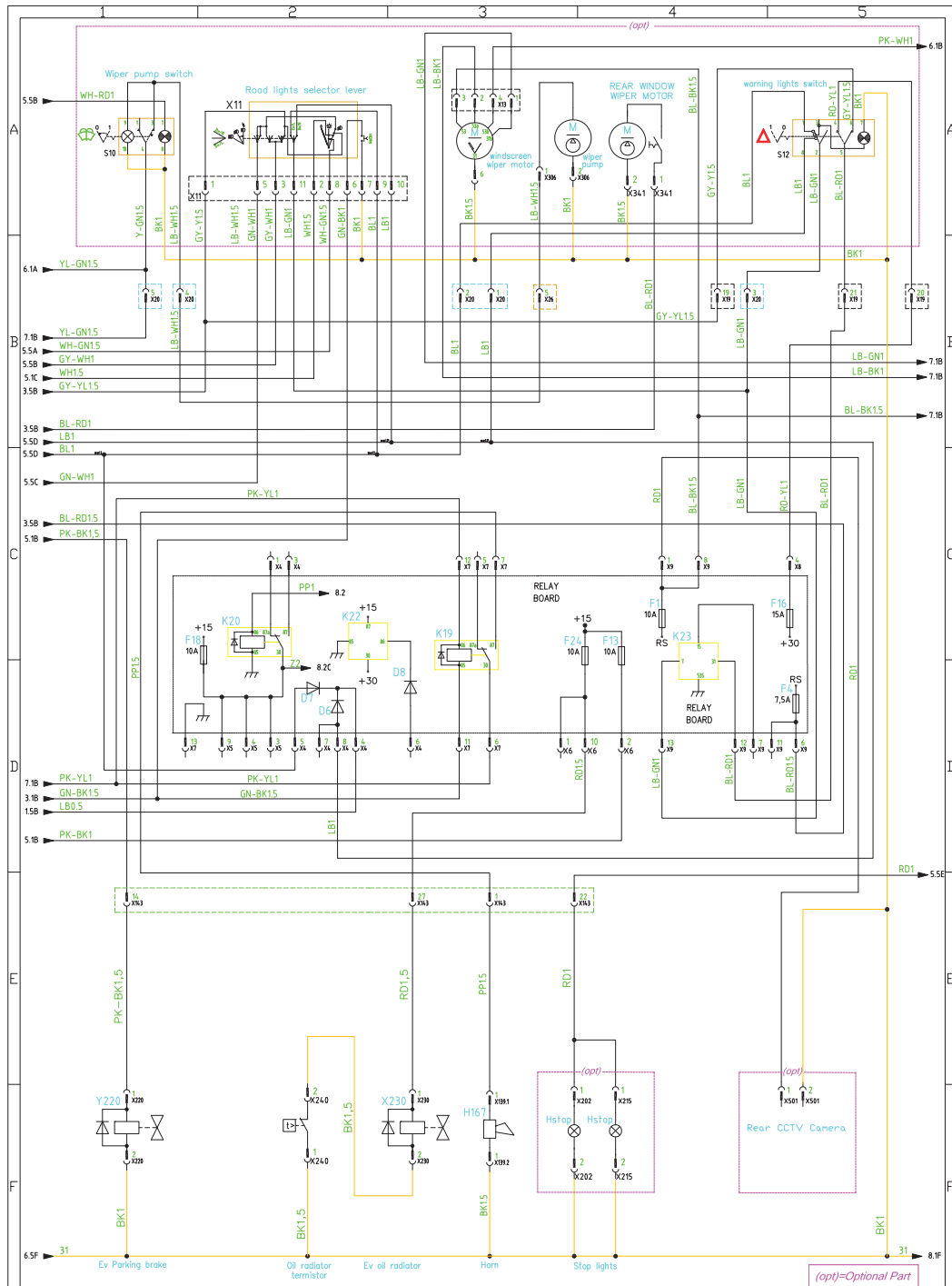
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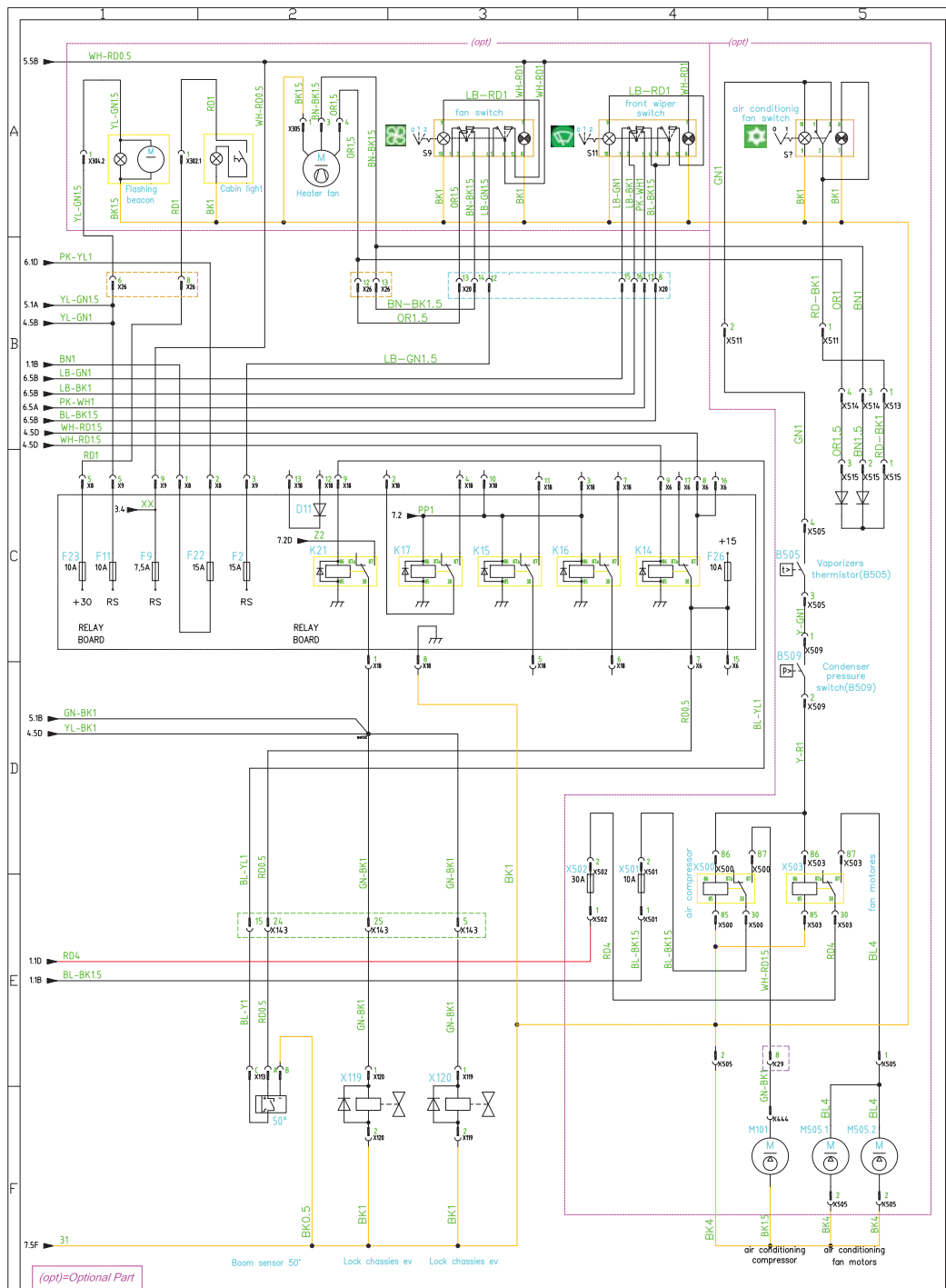


ELECTRICAL SCHEMATIC - PERKINS

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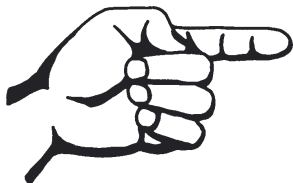
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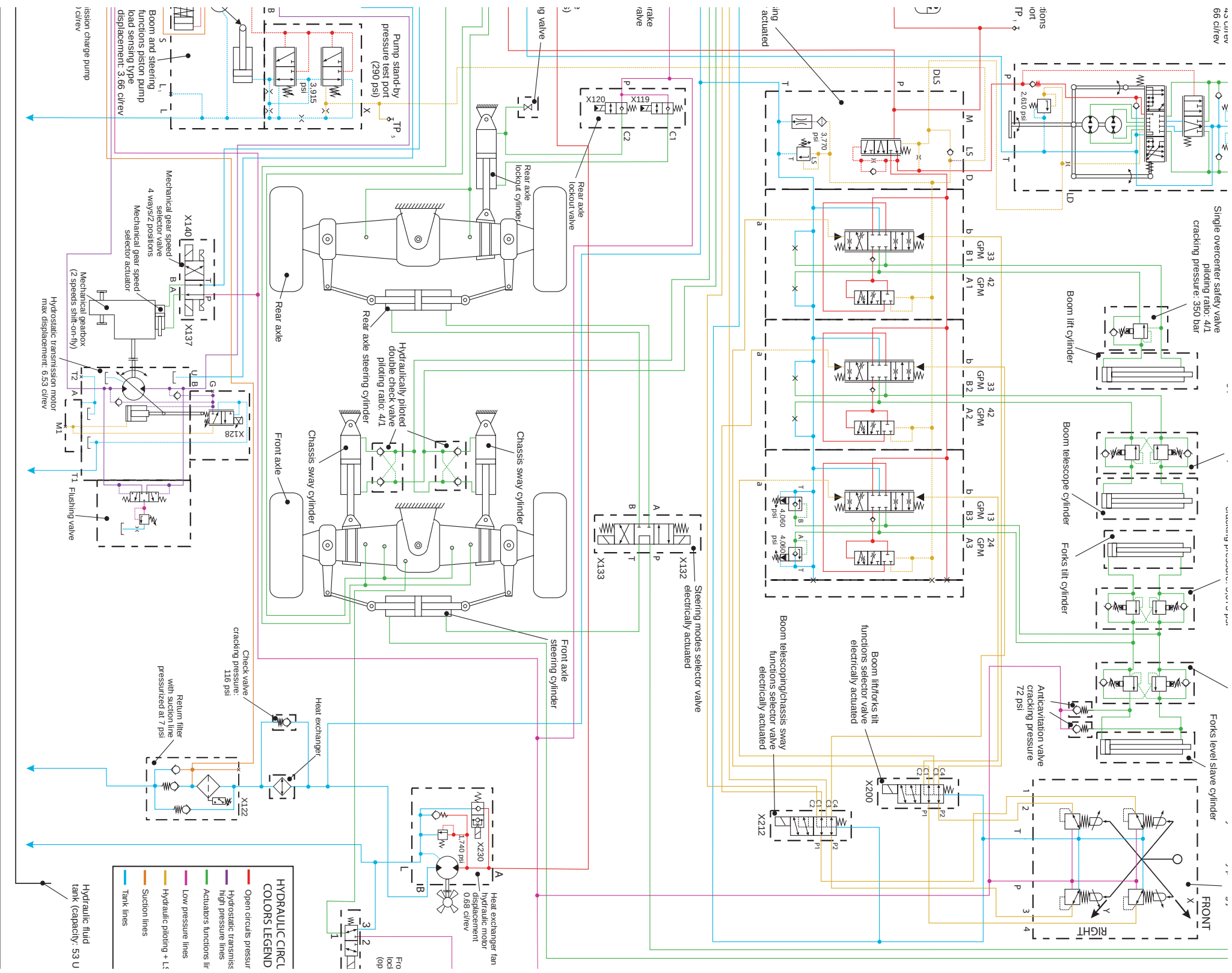
Hydraulical Schematic - Deutz Engine

Deutz engine - Sheet 1 of 2

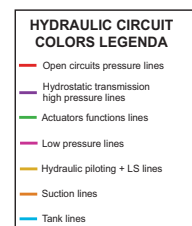


Hydraulic Schematic - Deutz Engine

Deutz engine - Sheet 1 of 2



Perkins engine - Sheet 1 of 2



Hydraulical Schematic - Perkins Engine

Perkins engine - Sheet 2 of 2

